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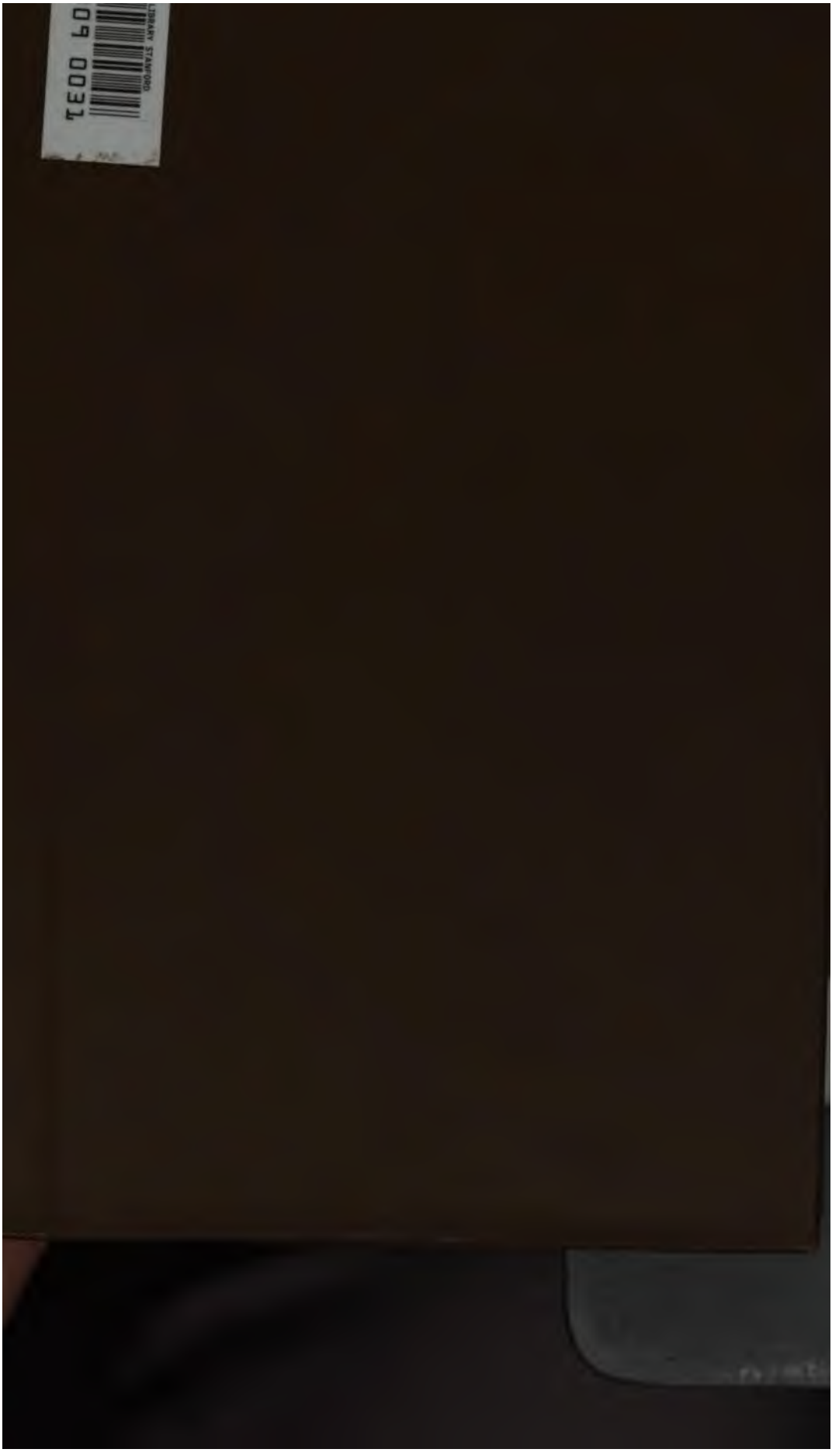
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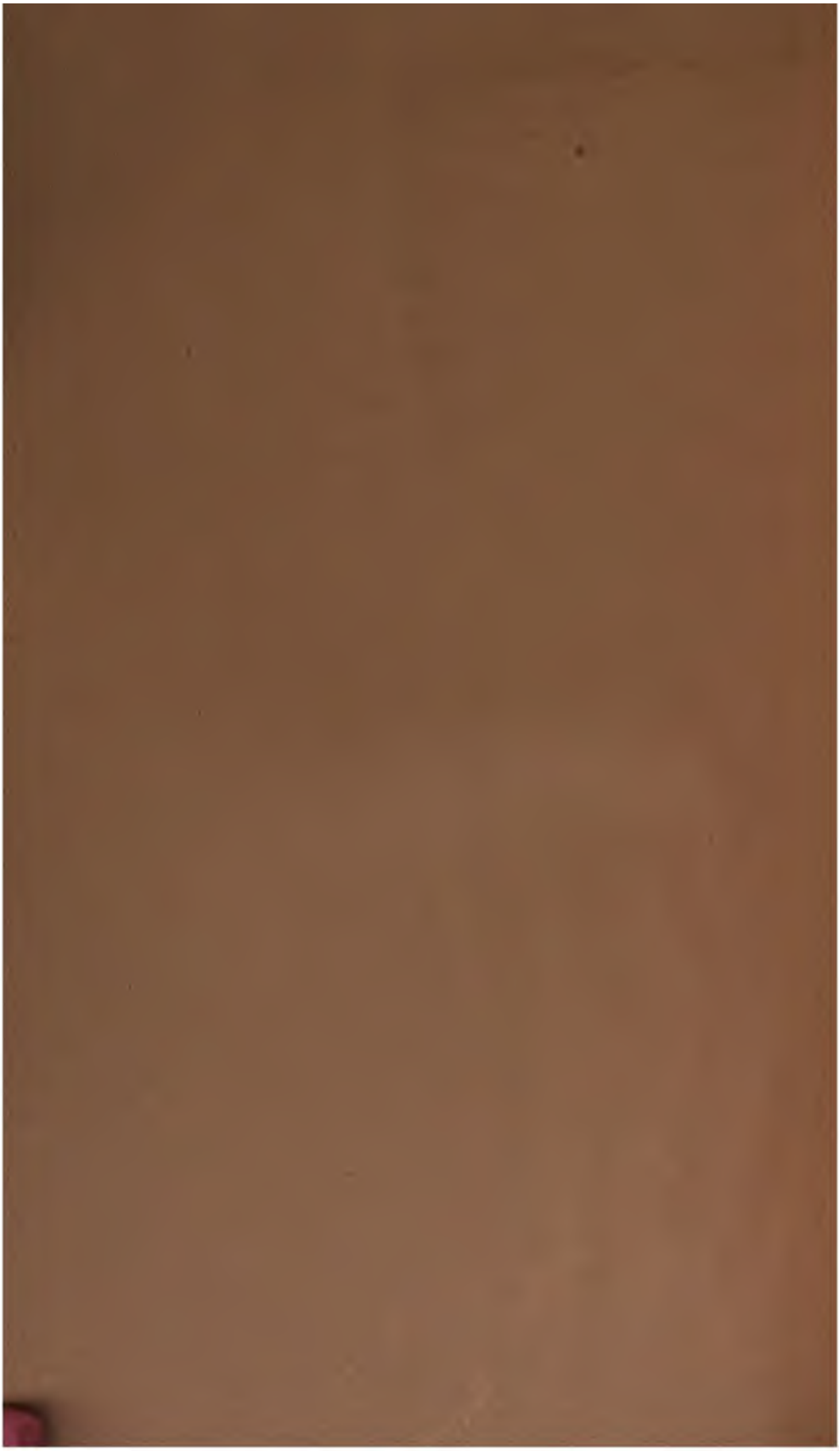

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TREATMENT OF

Syphilis of the Nervous System

BY

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X -1

TREATMENT OF SYPHILIS OF THE NERVOUS SYSTEM.

Prophylactic Treatment.

The treatment of nerve-syphilis should be first prophylactic, and second curative.

The somewhat stale, but nevertheless highly-important, principle that "prevention is better than cure," could hardly be more strikingly or efficiently illustrated than by the subject to which I now venture to ask your attention. Nerve-syphilis is under any circumstances one of the gravest diseases with which we have to contend in practice. It is, when left to itself, almost invariably fatal, having no tendency to spontaneous improvement or cure, but, on the contrary, a strong drift toward deterioration and death. Even if judiciously and energetically treated, it has generally proved more fatal than either typhoid fever or pneumonia; and although the patient's life may be spared, he may yet be left permanently disabled, so as to be a burden to himself and his friends; while it happens only too frequently that when we have succeeded in removing the symptoms, and apparently restoring the patient's health, we are confronted with a sudden and severe relapse, perhaps at a time when we least expected it. From whatever point of view therefore we may look upon the malady, it becomes clear that we have to deal with a formidable and determined enemy, and that we should do everything in our power, not only to repel but to prevent his invasion.

The prophylactic treatment of nerve-syphilis resolves itself into two distinct lines of action. The first and most important of these should be, to destroy the virus in the beginning of the disease; while the second is, to strengthen the nervous system of the patient who has had syphilis, by every means

in our power, so as to impart to it the highest possible degree of efficiency and resistance to the invasion of the complaint.

1st. For destroying the virus in the beginning, I would recommend the excision of the primary sore wherever this is practicable. Although there is still much discrepancy of opinion on this point, yet the balance seems during recent years to incline strongly in favor of excision—a proceeding which appears indicated, not only *prima facie* by a common-sense view of the question, but is also supported by a not inconsiderable body of direct practical evidence, which I trust may soon be much increased.

There will, however, always be a number of cases in which excision cannot be practised, on account of the situation of the sore; nor would I recommend the surgeon to trust in any case to excision alone. We cannot excise lymphatic glands which may be already affected when the patient comes under treatment, and some of which may be in inaccessible positions, as for instance in the iliac fossa. Probably all that can be claimed for excision of the primary sore is, not that it will absolutely prevent blood-poisoning, but that it will greatly attenuate it. I would therefore under any circumstances add further specific treatment, even in cases where excision has been successfully practised, should only the slightest secondary symptoms make their appearance.

That mercury possesses positive germicide virtues in the earlier stages of syphilis, when we have simply to do with blood-poisoning, and when the disease has not yet encroached on the substance of important organs—in other words, when it is only a blood disease, and has not yet become a flesh-and-blood disease—appears to me as well established as any other fact in therapeutics. Let me on this point quote the experience of a contemporaneous surgeon who has devoted a whole lifetime to the observation and treatment of these earlier stages of the disease, and who has had ample opportunities of following up the subsequent history of patients who have had syphilis in their earlier years. I allude to Mr. Henry Lee, whose special experience on this point is probably unrivalled, and who has recently stated that, when the patient has been in the first instance under a mild and sustained course of mercury of from eight to twelve weeks' duration, he cannot recall a single instance where the bones or the nervous system have been sub-

sequently affected. In order that this action may not be interfered with, he considers it essential that the patient should not be exposed to cold air or cold water, and recommends that small doses of iodide of potassium should be given to assist the action of the mercury. He does not believe that the necessary action can be maintained by mercury given internally; for if thus continued for a sufficient time and in sufficient doses, the drug is sure to disorder the bowels, and it will then have to be discontinued. When, however, the action of mercury in the system has subsided, it is difficult to renew it, for the system has in some sense become proof against it, and there is no way of properly completing the course. Mr. Lee prefers the calomel vapor-bath to all other modes of administering mercury, as he finds that its action on the skin tends to develop the disease there; it prevents salivation; it leaves the bowels unaffected, and may be continued any necessary length of time. If by being cured is meant that patients after proper treatment remain in future free from symptoms, do not infect their wives, have healthy families, and live as long as others, then he firmly maintains that syphilis is as curable as any other disease.

Mutatis mutandis, the same or nearly the same opinion has been expressed by other highly-experienced surgeons. I will here only quote Fournier, who says that syphilis which has been in the beginning well treated with mercury, is *peu de chose*. The patient may have roseola and papules, mucous tubercles in the mouth and elsewhere, enlarged glands, some baldness, headache and pain in the limbs; but he is not liable to any grave lesions. This view of the matter agrees so thoroughly with my own experience, that I think we may take it for granted that mercury, efficiently given in the earlier stages of syphilis, acts as a true germicide, leaving the patient's constitution uninjured to such an extent as if he had never had the disease.

Very different, unfortunately, is the aspect of things in cases where either no mercury has been given, or where this treatment has been prematurely broken off, or been accidentally interfered with. In such cases it is indeed not absolutely certain that the patient will eventually develop specific nerve disease, which may ruin his health, cloud his intellect, and finally destroy life; but there is at least the possibility, and in

some instances a strong probability, of such an occurrence actually taking place.

I will here advert to the nearly unanimous opinion of those who have seen most of nerve-syphilis, and which is to the effect that this is particularly apt to follow in cases where the symptoms have been unusually mild. Then the patient undergoes treatment for perhaps a few weeks only, after which all signs of the disease which have attracted his attention may have completely vanished. He believes himself cured, discontinues treatment prematurely, and thus lays the foundation for subsequent attacks of epilepsy, hemiplegia, and general paralysis. His constitution remains tainted with a subtle poison, of the presence of which in the system there may be no immediate evidence; and although perhaps nothing terrible may happen to him if the lines of his life are laid in peculiarly smooth places, and if he should be free from a neurotic predisposition, yet the system's powers of resistance to unusual occurrences and accidents of life are greatly diminished, and a catastrophe is more easily induced in such persons than in others. Anxiety, grief, and excitement; fatigues and privations; exposure to wet and cold; injuries to the head and other accidents, are more prone to beget serious consequences in such men than in those who have not had syphilis; while any departure from the ordinary rules of hygiene, more especially excesses in alcohol and sexual indulgence, and last, not least, hard intellectual work, may act as exciting causes of the outbreak of one or another of the various forms of nerve-syphilis.

Such being the case in persons who have no neurotic antecedents, either in their own life or that of their ancestors, matters become much more serious where there is such a tendency, as shown by the previous occurrence of nervous disorders in some of them. Where there has been epilepsy, paralysis, insanity, St. Vitus's dance, megrim, neurasthenia, or simply undue excitability of the nervous system, the liability of the latter to suffer from the additional taint of syphilis is largely increased. Out of 281 cases in which I have made notes on this point, I find that a neurotic tendency had existed previous to infection in 167, that is, in 59.9 per cent, a very considerable proportion, but which is probably still actually below the mark, since more especially hospital patients are often quite unable to give any reliable information on such matters.

2d. This leads me to the second point in the prophylactic treatment of nerve-syphilis—viz., that it is our duty by every means in our power to brace up the nervous system of patients who have had syphilis, so as to enable them as much as possible to resist any inroads of the disease on that vulnerable organ. From this point of view a tonic plan of treatment, in the widest sense of the term, is indicated after the mercurial course is finished, more especially in those in whom the earliest phases of the disease may have been neglected. The patient should, if possible, take a month's or six-weeks' holiday, preferably a sea-voyage; live as much as possible in the open air; have a course of medicinal treatment, into which phosphorus, quinine, and arsenic enter; while the state of the secretions should be carefully attended to with such means as Carlsbad salts and podophyllin, and the skin stimulated by hot sponging in cold weather, and cold sponging in hot weather, with a certain proportion of liquor ammoniæ added to the water. He should live plainly and according to rule, avoid excitement and hard work for a considerable time to come, and steer clear of sexual and alcoholic debauches. If such rules as these are strictly followed for some years, the chances of an outbreak of nerve-syphilis are considerably lessened, even in those who are constitutionally predisposed to nervous disorders.

I now proceed to the second portion of my discourse, and shall consider, first, the curative treatment of specific primary lesions, and second, that of ordinary secondary changes being consecutive to the primary lesions.

Curative Treatment of Nerve-syphilis.

1st. *The Treatment of Specific Primary Lesions.*—What are we to do when syphilis of the brain or other portions of the nervous system, whether as gumma, or as specific alteration of the coats of the arteries. or in any other form, has made its appearance?

Our mode of action must be determined by the fact that these lesions are, in the first instance, strictly specific; but that they will sooner or later, unless checked by treatment, lead to secondary ordinary lesions, either by simple pressure or by directly cutting off the blood-supply to the substance of the surrounding parts. The period at which these secondary changes occur can, in many instances, be determined with a

great amount of accuracy from the clinical symptoms which may be present, more especially if we have to deal with cases of gummatous basal meningitis, and subsequent disease of the arteries at the base of the brain, and softening of the corresponding cerebral areas. In other cases there may be great difficulty, or even impossibility of ascertaining this point. It is, however, certain that mixed lesions, which are partly specific and partly ordinary, occur very frequently, which is shown, not only by post-mortem examinations, but also by the fact, which is of common notoriety, that patients improve up to a certain point by specific treatment, but then cease to mend, showing that while the specific lesion has been benefited, the ordinary one has remained uninfluenced by our therapeutical procedures.

The more I see of nerve-syphilis, the more firmly am I convinced that mercury, if properly administered, acts as a true specific in all primary nerve-lesions, just as it does in the earlier manifestations of the secondary period; and that it is as such infinitely superior to any other drug or mode of treatment with which I am acquainted. Truly specific lesions are found to yield to this remedy, even if they be of the most severe character, and in a number of cases just as well at an advanced period as in the beginning of the complaint; and as they may remain uncomplicated with ordinary lesions, even after having existed for a considerable time, there is a possibility of their being completely dispersed, and the patient's health being entirely restored. So much is this the case that we need in some instances not despair of a man's recovery before he is dead, remembering Ricord's epigrammatic saying that "in the cure of syphilis everything is possible, even the impossible." Indeed most observers, who have seen much of this disease, have met with cases where the patient has, as it were, been snatched from the very jaws of death, and where he could not have recovered if his condition had been owing to any other cause than syphilis. A cure is sometimes effected, even after the patient has been ill for many years. I have lately succeeded in completely restoring a patient's health, chiefly by hypodermic injections of mercury, who had suffered for fourteen years from various symptoms of nerve-syphilis when he came under my care, viz., intense headache, epileptiform seizures, paresis of the left leg, vertigo, tinnitus

aurium, and obstinate insomnia, to which were added specific ulceration of the tongue and of the external meatus of the left ear. The patient had previously been treated with large doses of iodide of potassium, which may have prevented him from getting worse, but did not succeed in dispersing the specific lesions from which he suffered, every one of which, however, eventually yielded to mercurial treatment.

Tendency to get worse and great liability to relapses after temporary improvement or an apparent cure, are among the principal features of nerve-syphilis. A patient who has shown undoubted signs of it, and who is not treated, is as good as certain to die of it, sooner or later, with symptoms of general paralysis of the insane; while with regard to relapses we all know how trying and oftentimes apparently inexplicable they are, coming on either as soon as treatment is discontinued, or a few months or years after an apparent cure, being generally more severe than the initial symptoms, and less liable to be favorably influenced by treatment. Our object in the therapeutics of this malady should therefore be not only to relieve the patient of his present symptoms, but also to guard him against future attacks of the distemper. In order to effect this, however, a much longer treatment is required than has been found sufficient for the earlier period of syphilis. We cannot expect a patient with specific brain disease to get well by giving him iodide of potassium for six weeks, or by sending him for a month to Aix-la-Chapelle for inunction and sulphur-baths. It would be difficult to lay down any general rule as to the length of time which may be required for stamping out the distemper for good; all I can say is, that the treatment must be protracted and systematic, and should be continued, not only until the symptoms which may be present have completely disappeared, where this is possible, but for some time afterward, the length of which must be determined by individual circumstances, and be left to the discretion of the physician.

The plan of intermittent treatment has for a number of years past been greatly in favor with the profession. Fournier more especially has stated that mercury is apt to lose its effect when administered for a certain length of time. In his opinion the system gets accustomed to it after two or three months' use; and eventually no further good is done, as the

TREATMENT OF

Syphilis of the Nervous System

BY

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X -1

How should mercury then be administered in nerve-syphilis, when a protracted course of the metal is required?

The internal use of the drug encounters under these circumstances the same objections which may be made to it when used in the earlier stages of the distemper. It disorders digestion and causes diarrhœa; and has on this account to be discontinued, often before any remote effects may have become perceptible. The same remark applies to its introduction by the rectum, by means of suppositories. We may introduce the metal by washing the skin with mercurial soap, as recommended by Oberländer and Schuster; or by applying mercurial plasters and belts—an old method which has recently been revived by Quinquaud, who recommends a calomel plaster about three inches square to be applied to the region of the spleen for a week at a time, then to be left off for a week, to be resumed in the third week, and so on. Then we have Mr. Henry Lee's calomel vapor-bath, which is of such great advantage in secondary syphilis; and, above all, inunction, which has long been considered the most energetic mode of treatment, but which has a certain number of drawbacks that tell strongly against its habitual use. It is in the first instance a very dirty proceeding, and one most repugnant to the feelings of the patient; it is apt to be ineffectual where the patient attends to it himself, and requires the assistance of a practised rubber; and it often leads very speedily to severe stomatitis and diarrhœa, probably owing to the inhalation of mercurial vapor, which is set free by friction, aided by the extraordinary faculty which mercury has of evaporating and diffusing itself into the atmosphere at all temperatures, but more especially in hot rooms or during hot weather. In hospitals, and even in private rooms, those who attend upon or habitually live with patients subject to inunction, are for this reason exposed to receive the mercury into their blood by inhalation; and the urine of such persons has been found to contain quite as much mercury as that of the patients themselves. Finally, relapses are very common after this mode of treatment, more especially when it has been practised for a short time only.

These and other drawbacks have induced therapeutists for a number of years past to substitute the hypodermic injection of different preparations of mercury for the earlier methods of using the metal. The advantages claimed for injections are

that they are cleaner than inunction; that the dose given can be more exactly measured; that they are more effective, one injection doing as much good as ten or twelve inunctions; that the attendants remain free from the influence of the drug; and, finally, that relapses are rarer.

The different phases through which the hypodermic injections of mercury have passed are so recent and well known that I need not enter into them here. Suffice it to say that Berkeley Hill appears to have been the first to inject the soluble perchloride, and Scarenzio the first to employ the insoluble subchloride; but the names of Lewin and Liebreich, who have largely practised the injection of the perchloride and the formamidate, are more particularly connected with this mode of treatment, which they have done so much to introduce to the notice of the profession. The chief drawbacks of the soluble preparations, such as the formamidate, the peptonate, the benzoate, etc., have been found to be that they are too quickly eliminated, and that there is a difficulty in bringing the system under the influence of the metal, except by daily injections, which would be inconvenient for private practice. On the other hand, the principal objections to the insoluble preparations are, that they are apt to cause severe pain, and troublesome swellings and abscesses, as well as sudden and violent stomatitis and dysentery, which cannot be effectually combated, because absorption may still go on from the deposit which has been formed at the place of injection.

I have during the last twelve years injected a very considerable number of both soluble and insoluble preparations of mercury in the treatment of nerve-syphilis; and have taken a great deal of trouble, undeterred by numerous failures, in endeavoring to discover the best way of preparing the drug for entrance into the system, and the most advantageous method of using it with regard to dosage and continuance. The general result of my researches on this point has been that the periodical and long-continued injection of small doses of a non-irritant insoluble preparation is the best mode of employing the metal, and one with which one may go on without fear of disordering the system for a considerable time. If sufficiently persevered with, this mode of treatment tends more than any other with which I am acquainted to rid the system of all traces of the syphilitic poison, to remove present symptoms

which are owing to the latter, and to guard the patient against future attacks of the malady.

As the method which I am in the habit of using, differs considerably from those which are employed by others, I will now describe it in full.

1. The preparation I use, consists of one part of metallic mercury, thoroughly rubbed up with four parts of purest lanolin, and then well mixed with five parts of carbolic oil of 2 per cent strength. This forms a gray cream which is sufficiently fluid for injection, and ten minims of which contain one grain of metallic mercury. It is absolutely indispensable in preparing the cream that the whole of the mercury should be "killed" or extinguished, so that no metallic globules are visible at the bottom of the bottle. If any such should appear, the medicine has not been properly prepared, and should be returned to the dispenser. A well-made cream has, to begin with, considerable pharmacological advantages over other preparations which are in use. In the first instance, it constitutes a perfectly homogeneous mass, by which it is distinguished from those containing calomel in suspension, from Lang's gray oil, etc. This is a more important consideration than might appear at first sight; since it must be evident that, with a uniform mixture, the dose which it is intended to give can be much more accurately measured than with a mere suspension, which has to be shaken before it is used, and in which the active principle, being heavier than the vehicle, is apt to sink to the bottom, and is therefore unequally distributed. Indeed, in the ordinary calomel-oil, the calomel is at once precipitated on standing, and it is impossible to divide it equally. It has appeared to me on perusing reports of cases in which such an injection has produced untoward results, that the dose which caused the mischief may, for the reason just given, have been much more considerable than was intended. My carbolized mercurial cream, when examined with the microscope, shows no metallic globules, but an absolutely homogeneous mass throughout, in which all the ingredients are perfectly blended.

Another pharmacological advantage of this cream is its great stability. Many preparations which have been recommended are apt to become rancid or decomposed, or too stiff for injection, in a comparatively short time, and require con-

stant renewal and fresh making up, which constitutes a great drawback in practice. I have kept a sample of the mercurial cream for six months, after which it was as good as on the day when it had been prepared. It is true that, when it has been standing for some time, a few drops of the oil are apt to separate and rise to the surface, but on stirring the mass with a glass rod for a few seconds, it at once becomes quite homogeneous again; and owing to the antiseptic properties of the carbolic acid, the cream never turns rancid.

2. A very considerable advantage of the carbolized mercurial cream is, that its injection is habitually quite painless. Some patients are indeed so excessively sensitive to injections that they complain of pain after the injection of distilled water, and, in two cases out of forty-one, complaints of pain have been made to me after the injection. This, however, is quite exceptional, and occurred in hypersensitive persons who resented any other slight manipulation, for instance, eliciting the knee-jerk, equally keenly. In these two cases, however, only seven injections were made against nearly 1,250 in the other thirty-nine cases, which were completely painless. This habitual painlessness of the hypodermic injection of the cream is no doubt owing to the circumstance that carbolic acid has the property of blunting the sensibility of the terminal branches of the nerves with which it comes in contact, and thus rendering them incapable of transmitting painful impressions to the nerve centres. For the same reason, a solution of carbolic acid in water has been used with success for the relief of obstinate local neuralgia. The injection of the cream produces habitually a pleasant warm feeling in the part, which lasts for a few minutes, after which the patient is no longer reminded that anything unusual has taken place. How different is this from injections of the perchloride, of calomel suspended in oil, liquid gum, water or salt-water, liquid paraffin or benzoic ether! Such injections I have known to cause severe pain for several days, and occasionally for more than a week, even when morphine or cocaine had been added to them. Shoemaker, MacCall Anderson, Tacke, and others, have recommended to inject morphine or cocaine either before, or together with, or after, the injection of the mercury; and I have given this a patient trial, but on the whole with unsatisfactory results. Indeed, the pain often begins to be particularly severe on the

second or third day after the injection, when the effects of the morphine or cocaine have long passed off.

3. Many soluble, and all insoluble, injections which have been recommended are apt to cause hard swellings from the size of a cherry-stone up to that of a walnut, which appear on the second or third day; are hot, inflamed, and tender, and cause great inconvenience in walking, standing, or even lying in bed. They sometimes disperse in a week or ten days, but in other instances an abscess is formed, which breaks toward the tenth day or so, and may go on discharging for a fortnight or even longer. It may take six weeks before such an abscess is quite healed. In the discharged matter globules of mercury may be discovered, showing that the quantity intended for absorption has not been all taken up, but that some of it has remained *in loco*, and has been lost. I have never seen such hardening or abscesses produced by the injection of the cream, which I believe to be owing to the circumstance that carbolic acid tends to prevent inflammation and suppuration in any parts submitted to its action. I will, however, not go so far as to say that such a swelling could never occur, for I have once seen it caused by a hypodermic injection of distilled water in a highly sensitive person.

For the prevention of abscesses, authors have recommended the most elaborate antiseptic precautions, such as first washing the skin with soap, alcohol, carbolic acid, and mercuric perchloride; cleaning the syringe by first filling it with absolute alcohol, or a solution of sublimate; drying the canula over a spirit-lamp, and then anointing it with carbolic oil; injecting liquid paraffin before the mercury; using salicylic cotton-wool for wiping away the first drop of the mercurial preparation which appears at the point of the canula; covering the puncture with iodoform collodion, and letting the patient lie on his abdomen for some time after the injection, and applying electricity and massage to the puncture! All these multifarious proceedings may be dispensed with if the carbolized mercurial cream be used, scrupulous cleanliness of the syringe alone being required. The parts remain, as a rule, soft and in their ordinary condition after such an injection, as if nothing had happened.

4. The average dose of the mercurial cream which I am in the habit of using, is five minims, injected once a week into

the glutæi muscles. This amounts to half a grain of mercury, but as nearly a minim is lost by some of the substance adhering to the walls of the syringe and canula, the dose which really enters the circulation is somewhat less, viz., about two-fifths of a grain. I have rarely found it necessary to exceed this dose, and have given even less in anæmic and ill-nourished persons, with whom any form of mercury is so apt to disagree. I should also inject less in women, who do not bear hypodermic injections, in general, so well as men.

Where the effect appears to be tardy, I have preferred giving iodide of sodium at the same time, so as to retain the mercury longer in the system, rather than injecting larger doses of mercury, which might cause anxiety as to the possible occurrence of stomatitis or dysentery. Where the teeth and the mouth generally are in a bad state, I give chlorate of potash, both externally and internally for a time. In some cases the glycerinum acidi carbolici, diluted with water, answers still better as a mouth-wash.

The dose which I recommend is, therefore, about one-fourth of that which is habitually used; in other words, I spread over a month what is generally given in a week, or even in four or five days.

5. The hypodermic injection of the carbolized mercurial cream is highly effective in cases of truly specific lesions of the brain, spinal cord, and nerves, as shown by the steady improvement, and in favorable cases by the eventual disappearance of the symptoms of gumma and arterial disease. By "favorable cases" I mean those which have remained uncomplicated with severe ordinary secondary lesions. There were thirteen such cases out of forty-one thus treated. Specific eruptions and ulcerations, which are not infrequently present at the same time, heal well under the influence of this treatment, sometimes after having existed for years. The patients generally express themselves as feeling better a day or two after the injection, in the beginning of the treatment. The bowels often act with more freedom on the first two days than during the remainder of the week. I have often seen the tongue, which had been dry and furred, become moist and clean, while appetite and digestion improved, and a general tonic influence was manifested, owing, no doubt, to the neutralization of the toxines which previously infested the system.

The elimination of mercury from the blood and the tissues takes place in the saliva, from the secretions of the liver and intestines, and more especially by the urine. In the latter it can be shown by Riemann's and Almén's methods, between twelve and twenty-four hours after the injection.

The principal excretory organ of mercury being the kidneys, it behooves us to see that they are in good condition before commencing this treatment. Kaposi lost a case, which he treated with injections of Lang's gray oil, where there was albuminuria. In case we should discover this latter condition, before or at any time during the treatment, we should either not resort at all to the hypodermic injection of mercury, or else do it with extreme caution, and in much-diminished doses. I have, however, not met with albuminuria in any of the cases which I have submitted to this treatment.

There is still much diversity of opinion about the value of calomel in inunction in the treatment of nerve-syphilis. Some writers rest upon this salt as our sheet-anchor in the management of these cases, while others reject it altogether, and consider it with more rather than good, more especially if given in those large doses which are now generally thought advisable. It is to be given at all. No one can be more convinced of the value of this medicine in rapidly combating and arresting the progress of symptoms of nerve-syphilis than myself; but I have not found it to possess actually curative properties. In these I have in former years trusted to this drug to the exclusion of mercury. I have almost invariably had imperfect results and serious relapses; and I can therefore assign to it only a secondary place in the treatment of these affections. It is, however, in general indispensable where there is danger of delay, and should then be given in tolerably large doses, and if necessary, by the rectum. Some physicians are disinclined to exceed a dose of five grains, while in the United States as much as 30 grains are given as a dose, even to a child. I rarely give less than twenty or more than forty grains as a dose, and have with this generally attained the end I had in view. Inunction of calomel is often more easily borne than the administration with it portion of the effects of the drug is probably owing to its impeding the elimination of mercury from the system when this is used at the same time, and thus producing the effects of the principal drug.

I have not seen any truly specific effects from other drugs, such as gold, sarsaparilla, stillingia, and others which have from time to time been in favor. I have, however, formed a high opinion of the value of a general tonic plan of treatment, more especially in cases of long standing, and where the powers of the system in general have been much reduced. Where the patient's general health is fairly good, the mercury alone seems to act as the best tonic, no other strengthening medicine being required. But where there is wasting and inadequate functions in general, quinine, cod-liver oil, and malt extract should be given. The latter is very useful in combination with pepsin, pancreatin, and the hypophosphites. The diet should be nutritious and easily digestible. The patient must lead a quiet life, avoid excitement and worry, late hours and violent exercise, and more especially shun any excesses in drinking and sexual indulgence, which latter are the most dangerous of all. Excessive smoking—which is so apt to lead to the abundant eruption of mucous tubercles in the mouth and tongue in the earlier stages of syphilis—is hurtful in nerve-syphilis, more especially where reflex excitability is unduly increased, as in cases of specific epilepsy, hemiplegia, and spastic spinal paralysis. In such cases smoking should therefore be entirely prohibited or greatly reduced.

2. *Treatment of Secondary Ordinary Lesions.*—I regret to say that I am unable to recommend any truly specific remedies for the secondary ordinary lesions which are apt to follow in the wake of the primary specific changes; nor is it likely that any such will ever be discovered, seeing that there is no such reproductive power in the central nerve-cells as we find, for instance, in the peripheral nerves. On the whole, however, I consider the constant current of electricity the most useful agent in the treatment of these secondary lesions; for although it cannot restore destroyed nerve-cells, it often does much good by promoting nutrition where nerve-tissue has been simply damaged, and by improving the circulation of the blood in the affected vessels. For this purpose central galvanization with a large electrode on the epigastrium, and another smaller one applied successively to the forehead, vertex, mastoid processes, and cervical vertebræ, with a current-strength of from one to five milliampères, applied for from ten to fifteen minutes, according to circumstances, is the most

generally useful mode of employing the electricity. In cases where the seat of the lesion can be very accurately localized, for instance, where the motor region of the cortex is suffering, the corresponding points of the head should be more particularly acted upon; and the direction of the current should be changed once during the application, so that the nervous areas acted upon receive alternately the influence of the positive and negative pole. The current often proves of benefit in the distressing headache and the various neuralgic pains from which these patients are so apt to suffer; it improves sleep, and allays the undue excitability of the nervous system which so often accompanies local lesions.

In syphilitic disease of the spinal cord, faradization of the skin by means of a large wire brush seems sometimes more effectual than the constant current.

A most valuable application in cases of brain-syphilis is cold to the head by means of Leiter's tubes, which often acts better than morphine, antipyrine, the bromides, and chloral. These last-named remedies, however, may also be necessary in severe and obstinate cases. Finally, we must do everything in our power to strengthen and support the patient's *morale*, and cheer him up in his mental and bodily sufferings with prospects of eventual recovery, or at least substantial improvement, wherever this can be reasonably expected.

In bringing these remarks to a close, I venture to express the hope that the principal agent in the treatment of nerve-syphilis which I have recommended, viz., the periodical and long-continued hypodermic injection of small doses of the non-irritant carbolized mercurial cream, will be tested by you in your practice, and may be found by you to deserve the place which I have assigned to it in the treatment of these affections. If such should be the case, I shall be amply repaid for the trouble and time which I have given to the subject; and I trust that, in future, when this therapeutical proceeding shall be perseveringly used at an early period of the terrible group of diseases with which we have to battle, the prognosis of nerve-syphilis in general will become more favorable than it has been up to the present time.

RAILWAY INJURIES:

WITH SPECIAL REFERENCE TO THOSE OF THE BACK AND NERVOUS SYSTEM

IN THEIR

MEDICO-LEGAL AND CLINICAL ASPECTS.

BY

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RAILWAY INJURIES.

CHAPTER I.

INJURIES OF THE BACK.

THE aim of this book is to give an account of the injuries sustained in railway and similar accidents which become the subject of medico-legal inquiry. In a book published in 1883, "Injuries of the Spine and Spinal Cord and Nervous Shock" (Churchill, 2d ed., 1885), the results of my experience up to that time, together with the views I had been led to form of the nature of railway injuries, were placed on record. While this work is to a considerable extent founded upon the book of 1883, and draws largely from it, the scheme is somewhat different, for it is now no longer necessary to say wherein I had come to differ, and that very widely, from the opinions then prevailing as to the nature of these injuries. The task of preparing the former book had not been undertaken, it is right to say, without ample personal observation of the cases and injuries described. I had indeed been seeing them frequently during a period of nine years, and from the beginning I had resolved that I would not write a line upon the subject until after, at least, five years' experience. The four years devoted to the preparation of that book afforded time for an inquiry into the after-histories of a large number of injured persons, and a table of cases formed no inconsiderable part of it. It has been impossible again to undertake the extraordinary and systematic labor which that inquiry involved, the labor of travelling thousands of miles and the inconvenience of frequent absence from London. The length of time which was spent over the preparation of the former work has, moreover, been fully justified, for although I have more to say in the

present work than I said before, yet I have nothing to unsay as being out of accord with the later experience of eight additional years. And I have the further satisfaction of knowing that the views which I then propounded have been practically accepted by all who are familiar and have to do with injuries of this class, both in this country and in America, as well as in France, Germany, and elsewhere. It is unnecessary, therefore, again to travel over the ground which was formerly occupied in dealing with concussion of the spinal cord and "concussion of the spine." The theory which attributed the nervous symptoms after railway injury to meningo-myelitis of the brain and spinal cord no longer meets with general acceptance ("est définitivement abandonnée" is the expression of a French writer, Dr. Dutil), and it is hardly likely to regain it in the future, unless it has the support of more pathological and clinical facts than were originally adduced in its favor. The consequences of railway injury are happily not so grave as that theory demanded, but they are none the less deserving of attention because of the serious, albeit usually transient, effects which are wrought upon the nervous system by this form of accident.

Renewed attempts have been made in recent years to unravel and explain the complex nature of collision injuries; and by many writers in this country and abroad, by Thorburn, Dreschfeld, Ross, and Collier here; by Weir Mitchell, Dana, Hodges, Putnam, and others in America; by Charcot and many of his disciples, by Guinon and Berthez, Moricourt, Terrier, and Vibert in France; by Oppenheim, Strümpell, Bernhardt, and Westphal in Germany, and by a host of others, fresh light has beeen shed upon the traumatic psycho-neuroses and on the hysterical and neurasthenical conditions which are prone to ensue from the profound mental disturbance, and the shock to the whole nervous system, which a railway accident causes. This practically was the view which I sought to uphold, that most of the strange nervous symptoms so commonly seen after railway accidents were not due to physical injury sustained by the spinal cord, but were the more or less immediate concomitants of the profound mental emotion aroused by the unquestionably special features and incidents of every collision. And I endeavored to show how the accompaniment of some form of injury to extra-spinal, muscular, and ligamen-

tous structures was at the root of the entirely erroneous notion that the nervous symptoms were due to lesion in that part of the central nervous system which has its seat in the spinal column. The further experience gained since I last wrote has confirmed the opinions which I then expressed; and the extensive opportunities which I enjoyed of studying this class of injuries during my seventeen years' tenure of the office of Surgeon to the London and North-Western Railway Company, warrant me now in laying before the profession in a more comprehensive manner what I have to say on the subject of railway injuries.

The book makes no pretension to be a text-book of nervous diseases. It is simply one chapter in their history; and if for convenience' sake it is itself divided into chapters, it is as one chapter on the subject of which it treats that it must be read. The various parts of it are meant to hold together, and if the statements made are not every one of them supported by the published record of individual cases, none the less are they founded on actual experience and observation. I have throughout endeavored fairly and evenly to hold the balance, bearing in mind that no work upon such a subject can be, as I am desirous this should be, of use to others, unless it is conceived in a judicial spirit, and is free from partiality and bias.

The object of this chapter is to give an account of the spinal injuries which are so frequent in railway collisions. It is, of course, true that injuries of all kinds and degrees are caused by railway accidents, but they differ in no respect from those which are seen after any and every form of violence. Nor indeed do injuries of the back received in railway accidents differ from injuries of the back received in many other ways, but their frequency, and above all the character which they impress on the features of many other forms of railway injury, especially on those which will be dealt with in the succeeding chapters, demand for them a place by themselves, and a separate chapter for their consideration. Their frequency is a matter of no question. It has been attested by Riegler ("Ueber die Folgen der Verletzungen auf Eisenbahnen, insbesondere der Verletzungen des Rückenmarks," Berlin, 1879. Riegler gives statistics which show that, since the passing of a law in Germany for the compensation of persons injured on railways, the number of injuries or complaints of injuries had enormously

increased, and that, moreover, of thirty-six complaints after injury no fewer than twenty-eight were of the back), by every one, in fact, who has ever written on the subject of railway injuries, while among my own cases more than 60 per cent of the injured persons made some complaint at some time or other of having been hurt in the back. The influence of such injuries upon the more purely nervous effects of railway accidents it will be one purpose of this book to teach, and those who do more than merely skim its pages will find how true it is, that the complexion of the other injuries to be described may be at times affected, or even changed, by them.

I will speak in the first place of the more common injuries of the back received in collisions on railways or in other similar accidents, and will refer afterward to those conditions or symptoms, which indicate that there may have been injury to one or other of the nerve elements of the spinal column. And it may be well to premise that in none of the cases quoted was there any reason to suspect the perfect *bona fides* of the injured persons. The following is a very frequent occurrence. A man has been in a collision; he was perfectly conscious at the time that he met with no blow—knows, in fact, exactly what occurred to him when the accident happened, and yet he finds that within a few hours, occasionally much sooner, he is seized with pain in his back. What has happened to him? Let us look at a case where the symptoms were simple and unobscured by other injury.

CASE I.—*Simple Lumbar Sprain—Traumatic Lumbago.*—M. A., a strong and active man, was riding in a first-class carriage, when a slight collision took place. He was, at the moment, leaning forward reading, and was not even moved from his seat. He felt a little upset and shaken, and had some brandy in consequence, but he was able in a few minutes to set off and walk to his business. The next day he felt some pain in the lumbo-sacral region, which on the following day became acute, especially on movement, and on the third and fourth days after confined him to the house. He was ordered a belladonna plaster, and in a week he began to improve, though having occasionally sharp pain. There was no local tenderness, and it is evident from the history that the injury in this case was a simple sprain of the muscles and ligaments

about the lumbo-sacral region. It was, in fact, a "traumatic lumbago."

In a slight collision like this it is very common to hear that the passenger was thrown backward and forward in the carriage, and although this man had hardly been moved, the sudden arrest of the train is frequently the means of jerking the traveller from his seat, and perhaps landing him upon the floor. Now it is that the physical structure of the spinal column exposes it to this form of injury. Endowed with extreme mobility in every direction, forward, backward, in rotation, and from side to side, as provided by its many articulations and by its thousand muscular and ligamentous attachments, it nevertheless has to guard the spinal cord within its central canal. To do this well, both conscious and unconscious effort is made at the moment of the collision to hold the column rigid, and as a result of the violence and of the sudden resistance induced by "setting" of the muscles and ligaments, the ligaments and muscular attachments are strained, overstretched, and, it may be, even ruptured in the dorso-lumbar or lumbo-sacral regions of the column. The injury is precisely the same as that which is met with every day, where a man complains that while lifting a heavy weight he suddenly felt a severe and acute pain, which almost prevented him from moving, in the lower part of his back. You examine him and can find no external sign of injury, but he hesitates to stoop when you ask him, he holds his back unnaturally stiff, he finds it difficult or impossible to rise from his seat, and very likely there is some local tenderness in the muscular mass on either side of the lumbar vertebræ. We may meet with the same injury in very different degrees of severity, and the pain may be felt at an altogether different part of the spinal column.

Case II.—*Cervico-dorsal Sprain.*—A man aged forty-two was in a train which ran (without time for warning) at fifty miles an hour into a coal train standing on the line. He was thrown suddenly forward, and instantly felt acute pain in the cervico-dorsal region. The pain was never again acute, but a weary aching was felt at the part for several weeks, both over and on each side of the spine. There were no other indications of injury, and the nausea and feeling of faintness experienced at the moment of the accident soon passed away. Obviously

the injury in this case was of precisely the same nature as the traumatic lumbago already named. The spinal injury may, however, be even more widespread.

CASE III.—*Sprain of the whole Vertebral Column.*—A rather smart collision caught a man, aged fifty-eight, sitting upright in the carriage with his head slightly turned to one side. He was thrown back, and his head was knocked against the partition, the brim of his hat fortunately saving him from a severer blow. He felt shaken and sick, but did not vomit. Within a couple of hours of the accident he was seized with pain, and tenderness was felt in the lower part of the back, especially over the two lower dorsal and two upper lumbar vertebræ. He was taken home and put to bed, where he lay for a month, suffering at first from such severe pain throughout the whole spine—cervical, dorsal, lumbar, and sacral regions—that he was barely able to move. There was never any acceleration of pulse, elevation of temperature, or peripheral pain. At the end of the month he began to improve, and was able to move his arms and his head without pain, and occasionally to sit up in bed. In a couple of months he was able to get up, and in three months to move about so well as to do a little business. He gradually recovered, and five years after the accident was reported to be in good health, although he still felt an "uncertainty" when travelling, and unless he carefully supported himself was liable to have a return of pain in the lower part of the back.

These cases afford good examples of the same kind of injury, though affecting different parts of the spine. It is unusual, however, to meet with cases such as these where there is no other complication. "Nervous shock" in its varied manifestations is so common after railway collisions, and plays so prominent a part in all cases which become the subject of medico-legal inquiry, whether they be real or feigned (in the "Times" of Saturday, February 19th, 1881, a case was recorded of an action against a railway company for injuries received by a man in accidentally putting his leg through a hole whereby he was thrown down and hurt his leg. The judge commented strongly on the fact that the symptoms complained of bore a strange resemblance to those heard of so frequently after railway collisions. The symptoms, I think, in such cases

ought properly to be termed "litigation symptoms," as I shall subsequently show), that we are almost sure to meet with the symptoms of it in association with pains in the back, and with points of tenderness along the vertebral spinous processes. It is this frequent combination of the symptoms of general nervous prostration, neurasthenia, or shock with pains in the back, such as these cases presented, which no doubt laid the foundation of the erroneous views which were at one time prevalent as to the nature of the common injuries of the back received in railway collisions.

A man has a general nervous shock, and at the same time he is alarmed himself, and gives continued alarm to others by the pain and tenderness, often very severe, which he suffers at some part of the spinal column, or of the structures lying contiguous to it. In the first two cases recorded there can be no question that simple muscular or ligamentous strain was the sole cause of the pain; and the entire absence of any indication of other injury shows that the cause of the pain, which extended throughout the whole spinal column, and made every movement of trunk and limb almost intolerable, was exactly the same in the third and more serious case. Cases like the last are rarely met with in ordinary practice, but railway collisions provide the conditions which determine the possibility of such extensive strain of the vertebral column. Now one part, now another, is sprained in the jerks and jolts which accompany most collision accidents, and the pain, more commonly situated in the lumbar region alone, may thereupon affect other parts of the column. And very variable may be this pain both in range of distribution and in character; and variable also the time when it may begin.

Case IV.—*Lumbar Sprain—Very Acute Pain.*—A young man who was in a bad collision began three days afterward to feel pain and stiffness across the loins, so that he moved with difficulty, and felt easiest when flat upon his back. The pain in his back gradually increased, and, to use his own words, he thought all was over with him, and that he was going to be paralyzed, for when he tried to stand up a sharp pain seized him in the back like a knife cutting into him, and shot downward and upward from the loins like an electric shock, so that he dropped upon the floor. This state of things lasted for about three weeks, during which he lay almost help-

less, and had the greatest difficulty in defecation and micturition. There was at the same time considerable local tenderness, but never any outward sign of injury. This description is almost characteristic of an attack of acute lumbago.

Stiffness, however, and local pain are not the only indications of spinal sprain. There is very often some degree of local tenderness as well, felt on pressure over one or more spinous processes, or occupying a wider area on each side of the spine, and it is important to inquire whether this is evidence of some graver injury than I have said is ordinarily signified by the local pain. My own experience lends no support to this supposition. Local tenderness is often found in cases of simple sprain of the back from lifting heavy weights, and it would be very strange if the same symptom were not found in those cases, where the spinal sprain has been caused by the severe wrenching and straining suffered in a railway collision. In the worse cases the same conditions are in all probability produced as are to be found around an ankle or other joint which has been sprained, but you cannot see the swelling about the small joints of the vertebral column and about the muscular and ligamentous attachments, simply because the structures sprained are more deeply situated, and are much smaller in size. A deep-seated discoloration, however, may be sometimes seen, even where there has been no blow. Tenderness is thus a more or less inevitable consequence of the injury, but is it by itself a more dangerous symptom than the pain on movement? Let us ask if tenderness of the back is a prominent symptom in cases of spinal cord disease which we see in our hospital wards. Is it not rather conspicuously absent, and is not a diagnosis made by a totally different train of symptoms? Any one who has ever looked at a vertical section through the centre of the spinal column, and has noted how far the spinal cord is from the surface, how the spinous processes overlap each other, and how thick is the mass of muscles on either side, must have felt convinced that all ordinary pressure on the column can have little or no effect upon the structures within. Tenderness by itself is therefore not to be regarded as an indication of grave injury to the contents of the spinal column; it is a symptom, which, if of any value at all, ought rather to reassure, as pointing to the kind of injury which we are here considering.

But although local tenderness may be of small value as evidence of intraspinal lesion, its long continuance at one spot is very decidedly suggestive of some inflammatory affection of one of the small spinal joints. "It may be deemed singular," Mr. Shaw writes in Holmes' "System" (Holmes' "System," Vol. IV., 2d ed., p. 103), "that numerous as are the small joints formed by the opposing surfaces of the oblique processes, in the posterior segment, disease is scarcely ever witnessed in them." Yet we know that these joints may be very seriously affected in rheumatoid arthritis, and that they do not escape suppuration in pyæmia. There is no inherent reason why one or more of them should not occasionally be affected by a simple synovitis, such as is seen in other and larger joints as the result of injury. Traumatic synovitis of a spinal joint is doubtless extremely rare, but it may be occasionally the cause of otherwise inexplicable tenderness and pain.

The three most prominent and distinctive signs of simple sprain of the back commonly met with are stiffness, tenderness, and pain, and we have seen that these may be present at any part of the spinal column, or may even involve the whole of it. This widely-distributed "lumbago"—if the term may be allowed to indicate the aching and the pain on movement throughout every part of the spinal column—may of itself give rise to a form of pseudo-paralysis, which, if unrecognized, may cause unwarranted alarm. The pain in all movements may be so great, whether the movements be of the limbs, of the body, or of the head, that the patient is really afraid to move at all. This well-grounded fear of moving may soon assume the importance of an absolute inability to move, especially when the sprain has chiefly affected the lumbar and lumbo-sacral regions. Ask any man who has had a severe lumbago, whether from a sprain, from rheumatism, or from cold, if he has not at the same time felt a strange sense of difficulty in moving his legs. Brisk walking becomes impossible; the effort needed to put one leg before the other must be unnaturally great; fatigue comes early, and the patient complains to you that his legs feel weak, and as if he could hardly move them. The injury may frequently be diagnosed by the peculiarity of the gait alone.

Micturition may at the same time be interfered with, from lack of the natural support and help which the lumbar mus-

cles provide when this act is being performed. The patient, perhaps, cannot completely empty his bladder, and there is a certain amount of dribbling at the close of the act. It thus appears to himself that his "water runs from him," and if, as a consequence of slight retention, there be added some irritability of bladder, symptoms of somewhat ominous import seem to be developed. Many men find it practically impossible to empty their bladders when they are laid upon their backs, and "residual urine," recognized as perhaps the most frequent cause of cystitis, is very prone indeed to occur as the indirect result of any injury which dooms a man to bed. And this may arise quite independently of any retention due to shock, to which reference will be found at p. 72. It is obvious, therefore, that sprains of the lower back provide the very combination of conditions likely to lead to this result, and every now and then we find that trouble with the bladder may rise into considerable prominence. Especially is this likely to happen when the nervous system has been much upset by the shock of the accident, and you may find a condition of "nervous bladder," in which the patient has a frequent desire to pass water, with inability at the same time to perform the act perfectly, and consequent slight dribbling at its close. Constipation also arises from the same muscular incapacity, and becomes an almost invariable feature in the case. Thus it is nothing more nor less than natural for the friends to say that the patient is "paralyzed," and paralyzed from severe injury to the spine. If you do not avoid these fallacies, and do not correctly interpret this state of things, you will add greatly to the dread, which after railway collisions is strangely real, that "paralysis" is going to supervene.

This very natural fear of paralysis is still further increased by the abnormal sensations incidental to the muscular and ligamentous incapacity. There is a strange feeling of weakness in the legs, and the patient complains to you that he cannot walk, or that his legs give way when he makes the attempt to do so. Repeated observation, however, leaves no doubt in my mind that these results are more dependent on the fear of moving (this fear of moving was strangely shown by a man who had received such injuries as have been described, who was confined to bed in consequence, and who needed three persons to help him out of bed every time he

wanted to pass water in the day-time. To himself it appeared wholly unaccountable and extraordinary that whenever he woke in the night he could jump naturally out of bed without any help for the same purpose. It need hardly be said that the case was perfectly genuine) than on any real inability to move because of nerve lesion; and the personal knowledge of many hundreds of cases, together with the absence of any record of such a consequence in medical literature, enables me to allege that there is no more cause to anticipate real paralysis after a sprain of the back received in a railway collision, than there is after the thousand and one different kinds of injury which fall under the notice of the surgeon.

In the absence of other signs of injury for which, of course, full search will be made, do not therefore let undue weight be given to this pain and tenderness at one or more points of the spinal column, or to the stiffness and pseudo-palsy which accompany them. In cases of real damage to the spinal cord or its membranes, both pain and tenderness may help to localize the point at which mischief is going on, but they do not indicate the mischief itself, nor are they in any sense pathognomonic symptoms of spinal cord disease. In no wise would I undervalue the real importance of these vertebral sprains. They may be exceedingly distressing to the patient; the pains may last for a very long time; there may even be occasional reminders of pain for months or years under suitable conditions; but it is right that we should attach no more import to them than they deserve, and their existence should not entail a needless dread of serious injury to the structures within the spinal canal.

The long continuance of pain in the back is very naturally the cause of alarm to the patient, and of doubts as to his ultimate recovery; but if the pain be rightly estimated, and its real value as a symptom of spinal disease be recognized, there will be less reason for these fears. Look at it in connection with maladies other than simple sprain. In spinal caries, for example, we know that local pain at the site of disease is not one of the most pronounced symptoms, and that it is of much less value in diagnosis than pains at the periphery, instinctive dread of leaving the recumbent posture, or an absence of natural flexibility in the spinal column when the patient moves. The pain, indeed, is indicative of nothing more serious than

muscular or ligamentous strain. In character, moreover, it may be said to be almost typical of this form of injury. Aching, weary, and more or less constant both over and near the spine, and in the muscular masses on either side of it, it is liable to be rendered acute by movement, so that the patient dreads to move at all; or if he be able to go about, it is likely to seize him suddenly and sharply, to make him cry out for the moment, and to be followed by renewed aching of the back. The spinal pains are, indeed, very like the pains which may affect any contused or sprained joint, and there is precisely the same indication for treatment. Exercise—and not fixation of the whole back in poroplastic jackets—is essentially the best thing for relieving them, after adequate rest has been given to recover from the immediate effects of the shock, and to avoid what risk there may be from too early movement of the bruised and strained parts. True, the effort necessary to move for the first time may have to be very great, and the pain on first getting out of bed or attempting to walk may be so acute as to drive the patient back to bed again, yet if this initial pain will be endured, and a little perseverance and determination be exerted, it is pretty certain that the pain will daily be lessened, and that greater freedom of movement will be gained at the same time. In a sprained joint we know that stiffness and pain go frequently *pari passu* together, and the same associated phenomena in these injuries of the back form an additional aid to the diagnosis that the spinal pains are not of more serious import, than those due to muscular and ligamentous strain elsewhere. They share this feature likewise in common with them, that they have a tendency to last obstinately for a long time; to recur after intervals of comparative or entire ease; to be induced by changes in the weather, or by any extra exertion; and so, by their very nature, they unduly alarm the patient, and encourage him in the belief that his injuries have been greater than they really are, and that the prospect of his recovery, without permanent damage or disablement, is very remote indeed. It behooves us not to share in his alarm, but rather to use every influence to induce the patient to take those steps which alone can insure his recovery—to leave his bed, to have change of air, if need be, to improve his general health, and to allow of greater opportunities of movement than were he to stay at home. Be

careful, however, before all things, not to overlook any symptom which is a real indication of injury of the spinal membranes or of disease of the spinal cord.

Not for this reason only is it desirable to make a correct diagnosis as soon as possible, but also because there are few things worse for a patient, whether man or woman, than for the back to be constantly examined, and for pain and tenderness to be elicited over and over again at the injured parts. Repeated examination is the very way to develop a state of undue nervousness, and to bring about a hyperæsthesia of the surface which is often most distressing. Just as hyperæsthesia over a wide region of the skin of the hip may be seen in cases of so-called hysterical coxalgia, so a widely-diffused sensitiveness of the skin of the back may arise in many cases of simple sprain unassociated with other disease of the spinal column. Its onset and development may occasionally be observed, and its real origin be thus made manifest.

CASE V.—*Sprain of the Dorsal and Lumbar Vertebræ—Great Surface Hyperœsthesia.*—A young man was slightly shaken in a collision of no great severity, and in a few days had pains about the vertebral column such as have been described. He gradually recovered from the effects of the shake, but the aching in the back continued, and the spine was therefore more especially examined, not much attention having been paid to it hitherto. The examination revealed a point of tenderness on pressure over one of the dorsal vertebræ, at the point in fact where the sprain had probably been most severe. Within a day or two his back became so sensitive that he complained of, and shrank from, the very lightest touch of the finger on almost every part of it, whether over the spinal column or over the muscles at the side. He was so sensitive to touch that he endeavored to avoid being touched at all, seemed even afraid to have his back looked at, and moved himself away with so much contortion, as in itself to afford evidence of the absence of any serious mischief about the vertebral column or its contents. The hyperæsthesia was doubtless perfectly genuine; but in addition to the mode of onset, observe the inconsistencies of the hyperæsthesia itself. So great was it, that had it been real and not imaginary, it must have been unbearable for the man either to have rested against his couch, or even to have borne the contact of his clothes.

This is the hyperæsthesia so often found superadded to the pain which is a real consequence of the vertebral sprain; and yet too frequently the inconsistencies thereof are ignored, and the hypersensitiveness is regarded as another, and more telling, symptom of some inflammatory condition of the membranes of the spinal cord. It has little in common, however, with the hyperæsthesia or the "eccentric" pains which are a result of irritation of the sensory nerve-roots, whether by thickening of membranes or otherwise; and it is unlike the zone, or girdle of hyperæsthesia, which may feel to the patient like a cord, or some other abnormal sensation at the periphery. The hyperæsthesia is too wide-spread over one area, and is at the same time too limited to the area which is the chief seat of attention. It is, moreover, unlikely that real irritation of the sensory nerve-roots should give rise to hyperæsthesia upon the back alone. It is rather the natural outcome of that alarm, which, both in hospital patients and in those more especially who have been in railway collisions, seems to be inseparable from injuries to the spine or back; and although undoubtedly a real condition to the patient himself, it is yet unreal, and the product of his disordered imagination alone.

It is hardly necessary to dwell upon the pain and local tenderness of which there is no sign when the attention of the patient is otherwise engaged and directed away from the affected part. These may be of the same nature as the hyperæsthesia, though much more often they have no real existence, and are heard from those persons only who are purposely exaggerating the effects of the injuries they have received. Let it be remembered that a far more important sign than variableness of the pain under examination, is the very fact that the attention of the patient can be so easily diverted from the affected part. Call to mind a case of severe inflammation of the knee-joint, and ask whether it is not well-nigh impossible to divert the patient's attention from his knee when being examined, and whether he does not guard it with all the more conscious care, because he is being asked questions wholly unconnected with the painful limb. The very readiness with which the attention can be diverted from the tender back is of greater diagnostic import than the spinal tenderness or pain.

The hyperæsthesia and tenderness just alluded to are of a nature akin to the tenderness which is observed in the cases of so-called "spinal irritation," a malady with which the brothers Griffin dealt very fully in 1834, in their interesting and well-known work, "On Functional Affections of the Spinal Cord." They there point out (p. 201) how spinal tenderness is a "common attendant on all hysterical complaints, on numerous cases of functional disorder where the hysteric disposition is not so obvious, and in many nervous or neuralgic affections." The tenderness might be both local and general over the spine, and in their judgment it was enough to throw doubt on any other symptom suggestive of intraspinal lesion or inflammation.

Passing, then, from the pain, tenderness, stiffness, and hyperæsthesia which are the more immediate signs of that kind of injury which the back most frequently receives in collisions, I proceed in the next place to speak of other symptoms or complaints which occasionally accompany them, and which may be regarded as evidence of damage to structures other than the bony, the ligamentous, and the muscular of the vertebral column.

And in the consideration of them it is necessary to bear in mind that however well the spine itself, and the muscles and ligaments which bind its various parts together, may be adapted for protecting the intraspinal structures from injury, even at their own expense, it is simply a question of the degree of the violence whether muscles and ligaments are alone injured by forces which tend to overbend the spine. Up to a certain point these soft structures may succeed in keeping safe the parts within, even though they themselves may suffer in the attempt; beyond that point their resistance is overcome, and there may, as a consequence, be separation of parts which it is their business to hold together. This is, of course, much more likely to happen when the violence has fallen upon one part, instead of being widely diffused, and a not uncommon way in which the cord may be locally damaged, is by overbending of the spine.

The pseudo-paralysis of muscular incapacity has already been described, but abnormal sensations of tingling and numbness, or of "pins and needles" in some parts of the limbs, are not very uncommon after severe collisions. (Abnormal

sensations described as "tingling" or "pins and needles" are, although purely subjective, much more trustworthy terms than "numbness," which the laity use with a signification wholly different from that in common use among ourselves. Dread of moving the limbs without causing pain, bodily weakness and stiffness from confinement to bed, or the sensations produced by general bruising of the limbs, may each and all be described as "numbness," even when we find, and the patient admits, that there is no real anæsthesia nor true loss of muscular or sensory power. Thus, for example, a man described his leg as feeling "numb" after having received a slight blow on the side of the knee.) All such complaints ought rightly to be regarded as worthy of attention and anxiety, especially if they last for any length of time after the accident, or if it can be definitely asserted that the spine alone received injury. It is rare, however, for the injuries received in severe collisions to be limited to a single blow on one part of the spinal column, and it is important to determine whether these abnormal peripheral sensations are not really due to some blow sustained by the limbs themselves, before deciding that they are the manifestation of central damage. When this obvious fallacy has been excluded, the remaining proportion of cases in which these complaints are made is found to be very small.

CASE VI.—*Severe General Vertebral Sprain—Sensations of Numbness and Tingling.*—E. H. D., aged thirty-five, received in a severe collision "a blow," as he expressed it, "down his whole back," and also on the back of his head from a falling carpet-bag. He did not consider himself much hurt, although from the account of his appearance there must have been a considerable degree of shock. He proceeded on his journey, but three-quarters of an hour after the accident he felt compelled to stop and go to bed at a neighboring inn. He then began to suffer from severe pain in the head, and from pain down the whole of the spine, but more especially about the sacrum and the lower cervical region. There were no marks of bruising. He also complained of "numbness and tingling" in his limbs, with some difficulty in moving them. He suffered for three days from extreme nervous prostration; dreaded the least noise; spoke only in a whisper, and lay in a darkened

room. There was, however, no disturbance of pulse or temperature, and he had been able to sleep without narcotic for a few hours on the night after the accident. On the following days his limbs felt more natural, and the tingling and sensation of numbness had very much lessened. In five days these sensations had completely disappeared, but he still suffered from much pain about the vertebral column, and movements of the neck and trunk were painful to him. He was excessively nervous, and much dreaded any examination of his back. The pulse and temperature were throughout normal. He continued steadily to improve, and in three weeks was able to be moved. In three months he was going out daily, walking slowly about three miles a day, but complaining much—especially under examination—of pain in and about his vertebral column, the movements of which were evidently stiff and painful. He was still very nervous and felt generally weak, but there was no impairment of motion or of sensation in his limbs. He returned to work in about seven months. Five years after the accident he was at work and in good health, though often complaining of his back, "especially when lifting heavy weights."

It is obvious both from the history at the time and from the long-continued pain afterward, that there was here precisely the same kind of injury, as far as the spinal column was affected, as in the two previous cases, but with the important addition of some abnormal sensations in the limbs, coming on synchronously with the pains, and disappearing after a few days. These sensations were general, and were not confined to any one limb or part of a limb; and although it is impossible to define their cause with certainty, there are good grounds for believing them to be due to some effect produced by strain or blow upon the nerve trunks proceeding from the spinal column to the limbs. In severe collisions, where there is a risk of the body being suddenly bent and strained in many different directions, it is, indeed, highly probable that every part of the spinal column is subjected to muscular and ligamentous strain, and it is not inconceivable that the nerves which permeate the column at both sides should be involved in the same injury.

No one will dispute the wisdom of absolute rest in all such

cases, even though there is no warrant for thinking that the symptoms will be followed by some less dubious indication of central nerve lesion. In themselves they are rare, and found only after the more serious accidents in which there is a risk of extensive bruising and straining of the whole body. Whether the result of definite structural lesion or no, the symptoms of nerve disturbance leave no trace behind; in other words, recovery from the condition on which they depend is complete: and although the precaution of absolute rest is imperative, there is no evidence so far to show that they are of more serious import than is the sensation of tingling in the ulnar distribution after a blow upon the elbow.

Their presence, however, does not militate against the broad conclusion that the spinal cord is very securely protected from injury in its osseous canal, and that we shall probably find more definite symptoms when there has been undoubted lesion of the marrow itself. No matter what be the organ or structure, the severity of a lesion may differ vastly in degree, and it may perhaps be that these abnormal sensations are the symptoms of a disturbance which, in cases of more obvious local injury, amounts to actual damage—discoverable and giving rise to less transient symptoms—of the spinal cord or of the nerves proceeding from it.

The record, however, of a large number of injuries indisputably proves that the cases are few and far between, in which there has been unquestionable lesion either of central or more peripheral parts of the nervous system. Lesions of the spinal cord are met with only in a few isolated cases, and it is essential that this fact should be duly recognized if a right estimate is to be formed of the much larger class of cases, in which the injury and symptoms are rather those of general nervous shock, variable in degree, protracted in time, where it may be held by some that there has been concussion of the spinal cord, even though there has been no evidence of blow upon, or of damage to, the structure of any one organ or part of the body.

Case VII.—*Severe Lumbo-sacral Sprain—Probable Injury to Cords of Sacral Plexus.*—S. V., aged forty-eight, the mother of several children, gave the following account of the injuries she received in a severe collision which occurred at

night, and in which a great many persons were hurt. She had no distinct remembrance of what happened to her, but after she had been carried home and put to bed, marks of severe bruising were found between the eyes, at the back of the head, on the chest, and more extensively about the lumbar and sacral regions of the vertebral column. Beyond the bruising there were no physical signs of injury to the spine. She was in bed for three months, suffering chiefly from pain in her back, so bad at first that she could not move in bed. She also had what she described as a "numbing pain down the left leg." At the end of three months she was so much better as to be able to get out, and shortly after to be moved to the seaside. Ten months after the accident her chief complaints were of pain in the back, especially on movement, and of a partial loss both of motion and sensation in the left leg. She was then using the leg as much as she could, though obliged to go about with crutches. There was very slight wasting of the limb, all the movements of which, it may be said, were sluggish and defective in power. There was diminution of ordinary sensation, slight only, but yet undoubted. There was no dragging of the limb in walking, the leg being rather held stiffly, and conveying the impression of injury having been received about the hip. There could, indeed, be no doubt that, in addition to the paresis, there was injury to the muscular and ligamentous structures about the hip and pelvis, injury which led to much of the stiffness about the thigh, such as might have been remedied by freer movement than the patient could give to it. There was never any paralysis of bladder or bowel. From the time when this patient was seen she steadily improved. Thirteen months after the accident she was able to abandon her crutches, though the report of her then was that "sensation is still very feeble in the injured leg, but there is still progress made." Two years later, or three years after the accident, this last report was sent by the surgeon under whose care she had continuously been: "The case you saw two years ago has resulted in a complete cure, and she is now able to walk about almost as well as ever."

It must, I think, be regarded as very highly probable that the impairment of motion and sensation in this case was due to some injury to the nerve trunks, but it is impossible to say

with certainty whether that injury was after the nerves had formed the plexuses outside the vertebral column, or when they still were individual cords in the cauda equina. If the paresis was due to traumatic lesion of the nerve trunks within the spinal canal, it is almost inconceivable that the effects could have been confined to the nerves of one limb only, and on this ground it seems more reasonable to conclude that the injury to the nerve trunks was outside the vertebral column. The length of time, moreover, that elapsed before the recovery of the patient, seems further to confirm this opinion, whether the essential lesion was of the nerves themselves, or, as is equally probable from the character of the blow, was hemorrhage lying around and pressing upon them.

CASE VIII.—*Lumbo-sacral Sprain—Probable Injury to, or Hemorrhage round, Pelvic Plexuses.*—A strong and healthy man, aged twenty-nine, was thrown down on the floor of the carriage in a sharp collision, and knew that he had had a severe blow over the right sacro-iliac region. He almost directly afterward had sensations of pins and needles all over him. These soon passed away, but he was in bed more or less for four months, suffering from great pain in the lower part of the back, and numbness and heaviness in his legs. For three months his pulse was as slow as fifty-six. Eight months after the accident he was still quite unable to attend to his work, and suffered at times very much from pain in the back and from weakness in the legs. This weakness more especially involved the right leg, and although every required movement could be performed, it was evidently done with difficulty, and there was some impairment of common cutaneous sensation. There was no wasting, and the reflexes were normal. His gait was distinctly suggestive of lumbar stiffness, and there was clearly in addition some defect in the innervation of his right leg; and five years after the accident, although he was well and at his work, there was still said to be pain about the sacrum and right hip, made worse by walking or long standing, and the right leg was described as being not as large as the other. This statement, however, there was no opportunity of confirming by a medical examination, and it must remain a matter of doubt whether any and what injury had been incurred by the pelvic plexuses.

It is never easy, in cases like these, to separate the symptoms which are due to interrupted or damaged nerve function from those which depend on muscular, ligamentous, and osseous bruise and strain. These last may be very severe, and may give rise to great mechanical impairment of motor power, producing the pseudo-palsy to which earlier reference has been made; and only a very careful examination of the limb, and of all the attendant symptoms, will enable one to decide that there has or has not been injury to nerve structures. In the great majority of these cases of general lumbo-sacral strain, they usually escape direct injury; but there is no question that this form of traumatic lumbago, due to violent wrench of all the ligamentous structures of the ilium, sacrum, and lower spine, of all others is the most painful and the most incapacitating, and the pain is very prone indeed to radiate widely from the part where it has its original seat. It is by no means uncommon, in cases of ordinary lumbago, for the pain to spread to the lower abdomen, to the testes, and down the legs, but there is no reason to think that the pain which radiates in this way, whether in simple or in traumatic lumbago, is due to any gross lesion in nervous structures. Help in diagnosis will always be had by learning the character of the blow which has been received in the collision, or the precise mode in which injury has been inflicted upon the back. My own inquiries and experience leave no doubt in my mind that any local lesion of nerve centres, or of nerve truks, has its origin in injury at or close to the part, and that the general concussion of the accident is inadequate to bring about so grave a result. The cases already given exemplify this, but not so markedly as the following.

CASE IX.—*Late Myelitis following Obscure Spinal Injury.*—T. L., aged twenty-nine, a thin, delicate man, was in a very bad collision in which three persons were killed, and in which a large number were injured. He could give no clear account of the accident, saying he was dazed and could not stand. He was confined to bed for about a fortnight, suffering much from pain in his back and legs. He then improved a little, and was able to go to a hydropathic establishment in the country, where he stayed for two months. His back continued to trouble him very much (this is in his own words),

but otherwise he improved. Toward the close of these two months the weakness which he had all along felt in his legs became a much more definite loss of power, and in a week or ten days he was quite unable to walk. Ten months after the accident there was no mistake as to his condition. Loss of power to move, and almost entire loss of sensation in his legs, paralysis of bowel, paralysis of bladder with alkaline urine, bed sores, and reflex spasms of the lower limbs, undoubtedly pointed to softening of the spinal cord. His pulse was frequent, and his temperature above normal. He complained of pain in the lower part of the back, but there was no marked tenderness. He lingered for some months without improvement, and then died.

It is unfortunate that no post-mortem examination was allowed in this case, for it would have been in every way desirable to have learned exactly the nature of the injury, if any, which the vertebral column sustained, and how it came to pass that the cord became affected. The precise train of events can therefore be a matter of conjecture only. Two months elapsed between the receipt of the injury and the onset of definite symptoms of inflammation and softening of the spinal cord itself, and there is unfortunately no more accurate record of what his condition really was during this period. The mode in which he was injured, however, seems to render it not improbable that there were symptoms which should have made a fortnight's stay in bed altogether inadequate, and so early a move to the country most unwise. For the accident really happened in this way, as was learned from another person who was with him at the time. The patient was thrown on his face on the floor of the carriage, and a very "heavy man then fell on the top of him, right in the middle of his back." There was thus no doubtful history of a blow, of obscure injury to a remote part, or of a general shake of the whole body, but a clear account of an accident so happening, that, without any visible signs of damage to the spine, there may well have been some separation of vertebræ, or some undue bending of the column, which, damaging at the same time the membranes of the cord, or causing slight intraspinal hemorrhage, was the real starting-point of the mischief which supervened.

I would suggest the following as a very probable sequence of events: A small localized injury of the membranes, or hemorrhage, at the site of the injury to the vertebral column, followed by a meningitis which was at first too limited in extent to give rise to any precise symptoms, but which preceded, and, having implicated the cord, was the cause of the myelitis which had a fatal issue. If this be the explanation, the meningitis must have at first been exceedingly limited; because traumatic meningitis does not usually follow an unobserved course. Sometimes it is acute, spreads rapidly, gives rise to definite symptoms, and has a fatal result. At other times a less violent inflammation leads to local thickening and adhesion about the spinal roots, causing peripheral symptoms of impaired innervation; or similar pathological changes may involve the cord itself, and setting up degeneration therein, present very definite indications of structural disease. But acute myelitis at so long an interval after injury is most uncommon. Still further doubt, however, surrounds this case, for at the time when the symptoms of spinal softening were becoming marked, the man had epididymitis. It is true that gonorrhœa was altogether denied, and that the epididymitis may have been caused by the frequent use of the catheter; but it is to be remembered that myelitis of the cord may be the result of thrombosis of the pelvic and vesical veins, a direct consequence of the same urethral inflammation which had produced epididymitis. It seems, therefore, within the range of possibility that the myelitis and the fatal result were not due to the injury at all.

I have seen no case of acute traumatic meningitis following railway injury, nor any in which I could satisfy myself of the presence of subacute or chronic meningitis as the basis of the symptoms of general nervous shock which are frequently seen after railway collision, and which will be described in a coming chapter. I have often heard "subacute meningitis" put forward as the cause of the localized pains in the back which are common after sprains of the vertebral column, more especially when such pains have been associated with general bodily weakness due to long confinement in bed or in the house, and with the nervousness and emotional disturbance which are inseparable from severe shock to the system. The history and course of the cases, however, and the entire ab-

sence of the real symptoms to which meningitis gives rise, have convinced me that no such serious mischief could exist. For meningitis of the spinal membranes is a serious organic lesion, and it is hard to believe that if subacute meningitis of traumatic origin were as common as some would seem to believe it to be after collisions, we should not much more frequently meet with cases of meningitis running an acute course, or with cases where there is likewise degeneration of the spinal cord.

Injuries to the cervical spine are, for obvious reasons—its lesser strength and its greater mobility—more likely to be followed by local meningitis than are injuries to the lower parts of the column; but wherever the lesion be, it should never be forgotten how frequently syphilis has a share in keeping up any chronic inflammation of the membranes of the spinal cord. (See paper by Dr. Buzzard on "Cases of Syphilitic Paraplegia," "Lancet," Vol. I., 1879, p. 469. After detailing a case of paraplegia, with strangely variegated symptoms, cured by anti-syphilitic remedies, he writes: "With the clear history of syphilis before us, we can well imagine that the meningitis was gummatous, and that it probably involved especially the internal surface of the dura mater (pachymeningitis), but extended also to the contiguous soft membranes.

Notice also that there was no tenderness on percussing the vertebral spines. The absence of this symptom is too often regarded as being almost inconsistent with the existence of serious lesion of the cord or its coverings. Nothing can well be less founded in fact. If we put aside cases in which the vertebral column itself is diseased, we shall find that the existence of very marked spinal tenderness points strongly in the direction of a functional nervous affection of comparatively little importance, and does not indicate a serious organic lesion of the spinal cord.") In a case under my own observation not long ago, the symptoms of a scattered meningitis—to wit, slight wasting and partial loss of motion and sensation in the legs—had been attributed to an injury to the spine: but as a matter of fact there was a very distinct history of syphilis, the symptoms had more than once been lessened and almost removed by the administration of anti-syphilitic remedies, and careful inquiry proved that the supposed injury was altogether trivial. And although, from a medico-legal point of

view, the presence of a syphilitic taint does not debar the patient from compensation for injuries received, such taint must of necessity be acknowledged if we are to form a correct estimate of the probabilities of recovery in any particular case. ("Inasmuch," says Dr. Ross [Diseases of the Nervous System, 2d ed., Vol. I., p. 293], "as there is no severe organic disease affecting the nervous system in which the results of treatment are so often satisfactory, so there is no disease which deservedly brings so much discredit upon the practitioner who overlooks its presence.")

Happily there is no doubt of the exceeding rarity of spinal meningitis as an immediate result of localized injury to the vertebral column. The same remark applies with especial force to the results of the injuries which have been considered in the early part of this chapter; and I know of no case in which meningeal inflammation has been caused by injury to some part of the body remote from the spine.

While then the victims of railway collision are not by any means exempted from liability to suffer from any and every form of lesion of the spinal cord and its membranous coverings, accumulated experience leaves no longer any doubt that these grave results are most uncommon, and that though the back is especially prone to suffer injury in this form of accident, it is the extra-spinal structures which, in ninety-nine cases out of a hundred, bear the brunt of the violence and suffer from it. Such is the immediate consequence, but in every medico-legal inquiry the future as well as the present has to be considered. What is the prognosis; and what risk is there after the receipt of some such obscure injury of the back as we have been dealing with, there shall supervene, as a consequence of the injury, the symptoms of degeneration of the spinal cord? No more vital question can be asked in treating of railway injuries. It has from the first engaged my very careful attention, and I have endeavored to learn of cases where there has been degeneration of the spinal cord as a remote consequence of spinal injury. My inquiries have either been singularly unsuccessful—and they have been made by direct oral and written communication with many professional brethren in all parts of the country—or it must be admitted that secondary and remote degeneration of the spinal cord, in cases where there has been no distinctive evidence of injury,

is very rare indeed. Nor have I been able to discover any grounds for thinking that the injured in railway collisions, numbering many thousands since the first accident happened, have afforded a larger proportion of those degenerative system-diseases of the spinal cord, which in recent years have so much engaged the attention of neurologists and pathologists, than have those persons who have not been exposed to the same influences. It is perfectly true that in some recorded cases the onset of a system-disease has had no more obvious cause than injury and there is nothing inherently improbable in such a sequence of events; but cases of the kind are wholly exceptional, and are too few in number to call for the introduction of any account of them in a chapter devoted only to the common and everyday forms of spinal injury as seen after collision accidents.

A survey has thus far been taken of the common spinal injuries of railway collisions, but there is nothing in all that has been said to suggest that these injuries differ in any way from spinal injuries received in other forms of accident. Their frequency is, however, unquestionable; and this, as we have seen, is due to the special nature of railway collisions, whereby the back is very liable to be sprained. Given a case in which a mere sprain of the back is the only injury sustained, there is not, and there ought not to be, much difficulty in diagnosis; but again, the nature of a railway collision determines a liability to other forms of health disturbance, which, in company with a spinal sprain, may make the diagnosis far from easy, and may be the source of needless alarm. Here step in to perplex the clinical inquirer those so-called functional, emotional, and hysterical disorders, which have yet to be considered, which are really due to the fright and mental shock incidental to railway accidents, but which have been too often looked upon as the result of injury to the spinal membranes or the spinal cord. Here also in very common association are the symptoms due to severe general nervous shock, which are seen even when there has been no evidence of injury to any one organ of the body, or of a blow, having been inflicted on any single part. They may come on soon after the accident, or be delayed for many hours; they are characterised by unfounded function both of body and mind, and are not

uncommon in those who have received no bodily injury whatever. As I shall have to point out, they are the continued expression of severe nervous exhaustion. Picture a case of this kind, and add to it sprain of the muscles and ligaments of the vertebral column with the resultant pain on movement, so obstinate in its duration, and the tenderness—sometimes acute—on touch, and it is neither more nor less than natural—though a natural mistake—that the whole condition should be attributed to some alteration or morbid change of the spine and spinal cord which have been concussed.

The jar or vibration of a collision must doubtless shake the spinal cord as much as the brain and every other organ of the body, but there is scant reason for an explanation of the symptoms of general nervous shock in degenerative changes of the structures lying within the spinal canal, simply because the patient has a painful, stiff, and tender back. However alarming such cases may be, the tendency is toward perfect recovery after a longer or a shorter time. And, inconsistent though it may at first sight appear that anything apart from the injury and the bodily condition itself should influence convalescence, it is none the less a fact, which daily experience confirms, that the period of recovery very frequently begins at the moment when all mental anxiety and worry are at an end as to the legal aspects of the case. The settlement of the patient's claim for compensation has a potent influence in bringing about convalescence, not necessarily because there has been imposture or a lack of perfect genuineness in the facts and features of the case, but because, as a very symptom of the malady itself, there must have been an inability to bear the strain of a medico-legal inquiry. The strain removed, the anxiety lessened, there is nothing now in the way of a hopeful effort being made to return to a more natural and healthful mode of life, and each returning day of improved mental tone forges one more link in the chain of progress toward recovery. I am not referring here, be it remembered, to cases which are not strictly genuine, and where there is grave reason for suspecting the *bona fides* of the patient. Examples of this kind are not uncommon, where the prospect of larger pecuniary gain acts as a temptation to keep up the invalid state; but we must be careful that the absence of objective signs of nerve

lesion does not lead us into the error of throwing doubt on the integrity and veracity of those who are really suffering from the symptoms of general nervous shock. There is a vast difference, however, between the false and the true, and the one can be distinguished from the other without much difficulty.

CHAPTER II.

GENERAL NERVOUS SHOCK.

HAVING thus far given an account of the injuries of the back which are commonly met with after railway collisions, my next duty is to turn to the cases vastly more numerous, and even more important, to which I have already referred under the name "general nervous shock." This term is applicable rather to the whole clinical circumstances of the case than to any one symptom which may be presented by the injured person. It is a phrase which, in its very lack of precision, appears suitable to describe the class of cases which we must now consider; for we shall see that the course, history, and general symptoms indicate some functional or dynamic disturbance of the nervous equilibrium or tone, rather than structural damage to any organ of the body.

We are all familiar with the term "shock" as synonymous with the collapse which accompanies all profound and sudden injuries, whether inflicted upon the head or upon some other part of the body. And this collapse or shock we are wont to regard as the immediate expression of lowered, or annihilated, function of the great nerve centres which preside over the vascular system; paresis of the heart and of the peripheral parts of the circulation being the essential factor in inducing the pallor and coldness which affect the whole surface of the body, and the mental enfeeblement which is due to impaired flow of blood within the brain.

This, however, is not the place to enter into any lengthened description of the nature of true shock or collapse. (Mr. Savory's article in Holmes' System is known to every one, and in Groeningen's "Ueber den Shock" will be found a full account of all the symptoms and of every theory upon it.) No matter how the injury may have been inflicted, provided only it has been sudden and severe, whether by railway accident or by the more ordinary casualties of everyday life, shock or

collapse in greater or lesser degree is invariably recognized as one of the features of the patient's general condition immediately after the injury has been received. The collapse may be lasting and profound, or it may be slight and transient, but in every case it is an immediate consequence of the injury, which, by its suddenness and severity, has induced the paresis which primarily affects the great central organ of the circulation. Nor need any description be given of the history and symptoms of cases of shock or collapse, with which all are doubtless familiar in hospital practice. There is, in fact, no condition which is more obvious or more striking than that of the seeming lifelessness, which is an indication that some severe impression has been made by injury upon the nervous system.

The term "lifelessness" is indeed an appropriate one to give to the state of shock from injury in its more serious degrees. There is a lowering of the vitality of every organ and function of the body, from mental activity and capacity to that of the least important function in the animal economy. And that which probably lies at the very foundation of many of the symptoms of shock or collapse is temporary paresis of the heart, and of the whole circulatory system. The slow, feeble, or almost annihilated pulse, the pallor of the lips and coldness of the extremities, the mental hebetude, the anæsthesia of the surface, the relaxation of the sphincters, the lessened secretion of the urine, the impaired muscular action, each and all are dependent in varying degrees on the paresis of the heart and vascular system, and on the impression upon the whole nervous system of which that is the first and most immediate result.

The collapse may be so profound as to be a source of greater danger to the patient than the bodily injury which he has sustained. The issue may be rapidly fatal, although death is the exceptional rather than the usual result of uncomplicated shock. The heart, under the appropriate treatment of quietude and warmth—masterly inactivity—or if need be, of stimulants—alcohol, strychnine, and digitalis—regains its normal power, and the functions are once more naturally performed. The collapse is frequently succeeded by a period of "reaction," in which the temperature and pulse are slightly raised until the equilibrium of health has been established;

but whether there be reaction or no, the symptoms pass away, and except as an indication for treatment, as a rule, they give us little more concern. Patient and surgeon are far more interested, after the subsidence of the initial collapse and its incidental risks, in the successful issue of the needful operation, or in the usefulness restored to the limb or organ which has been damaged. If these results be satisfactory, the patient leaves the hospital gratified at the recovery which he has made, and thankful, perhaps, that his injuries were not more severe. What has become of the collapse which on his admission into hospital was a striking feature in his case? Has it on after-symptoms, or has it, as we thought it had, completely passed away? Important questions these; but as a matter of fact we know so little of the after-history of hospital patients, that from their cases we can draw but little help in elucidation of the general nervous shock which is met with after railway collisions, and whose after-symptoms may perhaps be far more prominent than those which immediately followed the injury. Our hospital patients, as we believe, recover, and rarely or never do we hear of the symptoms, nor do we meet with the class of cases to which I shall direct attention now.

Surgeons are pretty well agreed that the collapse in cases of accident brought into hospital is usually very profound after the injuries—crush of limbs, for example—which railway servants meet with at their work, and which often call for operative interference. Compare two cases of like injury, the one received by accident on a railway, and the other by being knocked down and run over in the street, and there is great probability that the manifestations of shock will be much more marked in the former case than in the latter. The difference I believe is this, that in the one case there is an element of great fear and alarm, which has perhaps been altogether absent from the less formidable and less terrible mode of accident. How largely fright may of itself conduce to the condition recognized as shock is well shown by a case communicated to me by a surgeon of large experience, who, summoned to a railway station to see and conduct to the hospital a railway servant who had had his foot, as was supposed, run over on the line, found him in a state of collapse, and in greatest alarm as to the injury to his limb. Upon examination it

was discovered that the only damage was the dexterous removal of the heel of his boot by the wheel of a passing engine. And medical literature abounds with cases where the gravest disturbances of function, and even death or the annihilation of function, have been produced by fright and by fright alone.

It is this element of fear, this great mental shock which in railway collisions has so large a share—in many cases the only share—in inducing immediate collapse, and in giving rise to those after-symptoms which may be almost as serious as, and are certainly far more troublesome than, those which we meet with shortly after the accident has occurred. The reasons for this are not far to seek. The incidents indeed of almost every railway collision are quite sufficient—even if no bodily injury is inflicted—to produce a very serious effect upon the mind, and to be the means of bringing about a state of collapse from fright, and from fright only. The suddenness of the accident, which comes without warning, or with a warning which only reveals the utter helplessness of the traveller, the loud noise, the hopeless confusion, the cries of those who are injured; these in themselves, and more especially if they occur at night or in the dark, are surely adequate to produce a profound impression upon the nervous system, and, even if they caused no marked shock or collapse at the time, to induce a series of nervous disturbances at no distant date. "The principal feature in railway injuries," says Mr. Furneaux Jordan, "is the combination of the psychical and corporeal elements in the causation of shock, in such a manner that the former or psychical element is always present in its most intense and violent form. The incidents of a railway accident contribute to form a combination of the most terrible circumstances which it is possible for the mind to conceive. The vastness of the destructive forces, the magnitude of the results, the imminent danger to the lives of numbers of human beings, and the hopelessness of escape from the danger, give rise to emotions which in themselves are quite sufficient to produce shock, or even death itself. . . . All that the most powerful impression on the nervous system can effect, is effected in a railway accident, and this quite irrespectively of the extent or importance of the bodily injury." ("Surgical Enquiries," 2d edit., p. 37.)

In these purely psychical causes lies, I believe, the explana-

tion of the remarkable fact that after railway collisions the symptoms of general nervous shock are so common, and sometime so severe, in those who have received no bodily injury, or who have presented little sign of collapse at the time of the accident. The collapse from severe bodily injury is coincident with the injury itself, or with the immediate results of it, but when the shock is produced by purely mental causes the manifestations thereof may be both prolonged and delayed. Warded off in the first place by the excitement of the scene, the shock is gathering, in the very delay itself, new force from the fact that the sources of alarm are continuous, that they may recur for days, and for a time be all potent for evil in the patient's mind. "In certain temperaments, wrought into a state of extreme excitement, a comparatively severe injury may not be attended with that degree of shock which, under other circumstances, would be seen. In those cases, however, shock is usually deferred, and not altogether averted; and it may be all the more severe, seeing that reactionary mental exhaustion, itself a kind of shock, is superadded to the effects of bodily injury." (Furneaux Jordan, op. cit., p. 27.)

Due weight must, therefore, be given to alarm and profound mental emotion as causes of the symptoms of general nervous shock so frequently seen after railway collisions. Sufficient importance, indeed, has not been attached to them, and many errors in diagnosis have been made, because fright has not been deemed of itself sufficient to bring about the train of symptoms which will be described. On the one hand, we may hear the condition regarded as evidence of serious and irremediable pathological change in the chief centres of the nervous system; and on the other hand, no clear history of pronounced shock or collapse at the time of the injury being forthcoming, the symptoms are deemed unreal, and the *bona fides* of the patient is called in question. The mistakes are at opposite ends, and I hardly know which is the worse for the patient, who, really suffering and ill, lies in the condition in which we find him because his whole nervous system has received a shock, not so much from severe bodily injury which shows itself in unmistakable signs, as from the impalpable element of alarm, which has to be measured by the events of the accident itself, and by the temperament of the individual who has been affected thereby.

The indications of collapse at the time of accident are very variable. The profoundest grades are occasionally seen after the worst accidents, where there has been in all probability destruction of life and limb. In these circumstances it is no marvel that we should meet with examples of most alarming collapse, associated with definite structural injury, an injury such as would be commonly marked by collapse, however and wherever it had been received. The collapse, however, which in these railway accidents accompanies serious bodily injury, such as laceration of limb or fracture of bones—always excepting the collapse from severe concussion of the brain—is very rarely followed by the train of after-symptoms indicative of general nervous shock. This is a fact of great interest and importance, which will help to throw light upon those symptoms of general nervous shock which are often seen after the slighter degrees of initial collapse.

More numerous than the cases of profound immediate collapse are those where the accident has been less severe in its effects upon life and limb, and where the earliest signs of shock have been comparatively slight. "I was thrown forward and backward in the carriage; I felt myself shaken, but did not think I had been much hurt; I got out of the carriage, and was able to help some of the other passengers, and I came on home by the next train." Such is perhaps the simple story of the man who finds himself in a few hours, it may be only after two or three days, compelled to take to his bed because he feels so unnerved, and shaken, and ill. You make inquiry as to the more immediate effects of the accident upon him, and you perhaps learn that he felt shaken and was obliged to have some brandy, that he felt sick and faint for a few moments, or that he even vomited. He thought little of it, however, and gave help to others. A few hours elapse, and he finds he cannot sleep; he has aches and pains in various parts of the body, most likely in the back; he feels as if he had been beaten all over; he is thirsty, feverish, and ill; and, gathering fresh alarm from the very fact that he thought he had happily escaped all injury, he sends for his doctor, who sees that the symptoms of nervous disturbance and prostration have already begun. The prominent symptoms, however, do not always arise so soon. Conscious that he has sustained no bodily injury, the man continues at his work, and days go by before

it is brought home to him that he is not ready or active at his business, that he is soon tired, and has to leave off and lie down in the middle of the day. It is an increasing worry and annoyance to him to write his letters, or to talk with people on business affairs; the back of his head feels heavy, and his appetite deserts him. Nevertheless he struggles on, each day not feeling quite as well as on the day before, until at last the necessity is forced upon him of completely abstaining from his work. With varied modifications in detail, such stories as these are often heard of the effects which an accident has had on numbers of persons. It is clear, from what happened at the time, and from the early symptoms of reaction afterward, that there was undoubted shock immediately after, or within a short time of, the accident. Its early manifestations were slight, and were disregarded as little more than a feeling of faintness or of being dazed, but it was enough to show that the alarm of the accident produced an instantaneous or early result, and to be the starting-point of that disturbance of the nervous system which may assume an aggravated form, and continue for a very long time. It will be one aim of this work to explain how it is that the after-results of even very trifling initial shock from railway accident are often more lasting and serious, than are the later nervous symptoms of those in whom the early collapse, with extensive bodily injury, was originally more profound.

Lastly, at the other end of the scale are the cases where there is no evidence whatever of injury or of collapse, no faintness, nausea, or vomiting, no early reaction from an initial stage of depression, but where the after-history very closely simulates that of the more numerous cases which fall under our care. These I shall consider by-and-by, for few are commoner than cases of spurious nervous shock.

Let me now illustrate the kinds of symptoms with which we have to deal.

CASE X.—*Severe General Nervous Shock—Prolonged Symptoms—Physical Injuries Slight.*—S.W., aged forty-six, a tall, somewhat powerful man, was in a very severe and destructive collision. He received bruises over both arms and legs, and also a blow upon the face which abraded the skin over, and fractured the bones of, his nose. He was not stunned.

He lay for several days after the accident in a state of great nervous depression, with feeble and rapid pulse, and inability to eat or sleep. He suffered at the same time much distress from the fact that a friend sitting beside him in the carriage had been killed; and this seemed to prey constantly upon his mind. The bodily injuries proceeded rapidly toward recovery, and in seventeen days after the accident he was able to be moved home. Nine weeks after the accident he had fairly well recovered from his local injuries, and made no complaint of bodily sufferings. Examination at this date discovered no structural disease, but he was evidently in a most feeble and wretched state. The ordinary functions of the body were natural, but his mental condition showed extreme emotional disturbance. He complained that he had suffered continuously from depression of spirits, as if some great trouble were impending. "He is easily upset and prone to cry. He says he used to cry whenever he spoke to any one, but that now he has rather more control. He has been out of doors for a few yards, but was stopped by a sudden sensation as if his breathing were very short. His voice is very weak and indistinct, and occasionally he says it is almost inaudible. There is no disease of the larynx or adjoining parts. He sleeps very badly, waking frequently, and being constantly troubled by distressing dreams. His pulse is weak, 104. He occupies himself by a little reading, and by occasionally going out, but he feels so shaken and weak that he is unable to do anything more. In many respects, however, he is improving. The weight he lost is being regained. He can walk rather further, is not so ready to cry, and his voice is stronger." He remained in much the same condition for several months, though with undoubted tendency toward improvement. Fifteen months after the accident, several months, that is, after his claim had been settled, I learned that he was better, though yet very far from right, and he was considered wholly unfit for work. His history, given four years after the accident by his medical attendant, is as follows: "In my opinion he will never be anything like the same man again. His appearance is much altered. He looks much older, haggard, and has become very bald. His voice is very weak, almost gone at times. For some time he went about in search of health, but improved very slowly, if at all. Lately he has obtained two posts, the

work at which is of a very light nature. I just jotted down the following symptoms as he mentioned them, and I feel sure he would not wilfully exaggerate them. Very depressed spirits, sometimes palpitation, loss of sleep, bad dreams, very easily tired, can't walk more than two miles, then gets very tired and quite loses his voice. Did nothing for two years after the accident. Has lost all his energy. Sometimes has a great dread of impending evil. He can travel by railway without feeling nervous, but can't drive without feeling frightened all the time. I may add that his heart sounds are rather feeble, but not otherwise abnormal. Pulse 72. No special spinal symptoms; no paralysis; no bladder symptoms; always gets much upset if dining in company or if many people are talking near him. I knew him well before the accident, and he was a very energetic and very honorable man." Three years later his symptoms were still subsiding. Since he began regular work he had continued more markedly to improve.

It must be pretty obvious from his history, that this man's prolonged illness was due in only small measure to the bodily injuries which he received. From these injuries, indeed, he had recovered, as soon as if they had been inflicted in any other accident and in any other way. The cause of his illness and of his altered condition, even after the lapse of several years, was the mental shock, call it fright or what we may, which the whole circumstances of the accident wrought upon him. There is no reason, in such a case, to believe that the condition is due to any gross pathological change, such as the unaided eye might see upon the post-mortem table, and certainly there is not meningo-myelitis of the brain and spinal cord.

Evidences of the immediate effects of fright alone are, of course, not often obtainable. In the following case, however, it was recorded in the official report of the accident that "a man, name unknown, was so frightened, and trembled so bad, that he had to be detained all night."

CASE XI.—*General Nervous Shock—Great Fright.*—B. J., aged forty-four, a thick-set, somewhat robust-looking man, was in a carriage which ran off the line when the train had just left a station, and which, after jolting along off the rails

for a few yards, was turned over on its side. He says he was far more shaken, "terribly shaken" was his phrase, by the previous jolting than by the overthrowing of the carriage; and when he had got out, his condition was that mentioned in the official report. On the following day he travelled home alone, presenting on arrival so dazed an appearance that his doctor was immediately sent for. Ten days afterward he was suffering from muscular pains, increased by movement, in various parts of the body, and due, no doubt, either to bruising or straining when the carriage had been jolted and overturned. "He can hardly get any sleep, having before his mind a constant fear of the railway accident, and he becomes occasionally 'light-headed' at night. He is lying in bed with his eyes closed and the blinds down, complaining that he dreads the light. He gets very low-spirited, and frets about his business, the thought of which pains his head. He is much alarmed at the pains which he suffers, says he is afraid to move on account of them, and that he fears he has received internal injury. The bowels are confined. His temperature is 99° F., and his pulse is 102." Notwithstanding his expressions of fear, he was able to sit up in bed without sign of suffering, and in talking he moved his head naturally from side to side. He very soon also seemed quite content to have the blind drawn up, and gradually opened his eyes. There was no evidence of his having received any bodily injury other than muscular bruising and strain, and his condition was regarded by all who saw him as essentially one of general nervous shock likely to pass away after a time. When seen again at the end of two months, he had a somewhat worn and anxious expression, but said he was better, his "nervousness" being not so great as it was. "He complains of being easily upset and startled, and that the least excitement brings on a sharp pain in the head. The muscular pains are better, that which still troubles him most being a pain in the muscles of the left side of the neck. He sleeps better, though he occasionally has disturbed nights. He could walk two or three miles perhaps, but would be very fatigued. His pulse is 100." He had evidently much improved, and it was advised that after further change he should begin his work. Several weeks more elapsed, and I then found him neither looking nor feeling as well as before. He was very nervous about himself, felt

unable to do his work, was depressed and melancholy, and losing heart from the thought that he would never get well. He had been attending to his business for two or three hours a day, and the anxieties of it were very distressing to him. He was, moreover, very anxious to arrange his pecuniary claim for compensation, as both he and his doctors felt that that was now beginning to prey upon his mind. In bodily health he seemed well. Eighteen months after his claim was settled, I again had the opportunity of seeing him. He was then in perfect bodily health, able to follow his occupation as usual, and to endure as much physical exertion without fatigue as before the accident. He could not, however, remain as long at his desk without feeling worried, and his wife said that he was more irritable than he used to be. In these respects, nevertheless, he was admittedly improving, and he himself felt confident that before long he would be absolutely well.

CASE XII.—*Slight General Nervous Shock.*—A case of lesser severity is the following: M. F., aged forty-four, a man, to use his own expression, of "excitable temperament," was in a sharp collision which the whistling of the engine had warned him was going to happen. He had thus been able to prepare himself for the crash. He was conscious of having a blow on the back of the neck. He did not, however, think that he had been hurt, and was able at once to help the other passengers. This work over, he walked a mile to catch a train at another station, finished his journey, and completed the business which had called him away from home. On the following day he felt "queer," and sent for his doctor, who found him agitated and depressed, unable to occupy himself, and complaining that he felt shaken. His pulse was, however, natural, and his temperature normal. He subsequently suffered from sleeplessness, and he had pains in various parts of the spinal column, where it was supposed he had been sprained or bruised. There was never any evident disturbance of the organic functions, but for some months he suffered from sleeplessness, from much depression of mind, from inability to occupy himself, and from a constant sense of weariness in the small of the back. After change of air he found himself better, and then complaining that want of work was distressing to him, he attempted to resume his business, but found that it made him worse, more nervous and depressed, and more sleepless at night. Further

change of air, however, did him good, and in nine months he arranged his claim. In twelve months he was again at his ordinary work, having entirely recovered" from his illness. He continued at his business for some years afterward, and then retired.

Case XIII.—*Neurasthenia Induced by Fright—Previous* [illegible]—A lady aged twenty-four, was in a collision which [illegible] without the slightest warning. The luggage [illegible] and her husband was thrown [illegible] was neither moved from her seat [illegible] As soon as she got out she [illegible] a carriage had been smashed to [illegible] a man being rescued from the [illegible] She went on her journey, and [illegible] her own words, as if she had passed [illegible] and from that time onward she [illegible] her appetite and strength, suffered from [illegible] her head and at several spots down her [illegible] upset by any attempts at household work, [illegible] Thinking she had not been hurt, [illegible] her to do as much as possible and not to [illegible] steadily got worse rather than better, and [illegible] in the least hysterical, it was not until proper [illegible] that improvement set in. The case was [illegible] previous dysmenorrhœa and anæmia, both of [illegible] for a time by the accident.

[illegible] give a good idea of the history and class [illegible] which cases of general nervous shock usually [illegible] They were all of them, I believe, free from the taint [illegible] consideration or imposture, but it must be abundantly [illegible] how largely the reality of many of the symptoms [illegible] all vestige of objective sign, depends upon the [illegible] and good faith of the patients themselves. On this [illegible] that the cases are so difficult to describe, and [illegible] impossible to convey an adequate impression [illegible] those who may have never seen them. I propose, therefore, to bring together and to say something about each [illegible] symptoms which are commonly met with, or of which the patients complain, when suffering from "general [illegible] And here it may be well to premise that I

draw a broad distinction between the condition to which this name is given and that in which genuine hysteria is a pronounced symptom. General nervous shock is not hysteria. It is frequently met with in those who show no hysterical disturbance whatever, as likewise there may be much hysteria without any symptoms of general nervous shock.

Nevertheless, while I see much to agree with, and that I cannot improve upon, in Mr. Thorburn's tentative classification of the post-traumatic functional neuroses ("A Contribution to the Surgery of the Spinal Cord," p. 186. Griffin & Co. 1889)—

"1. Acute effects.

"(*a.*) General nervous depression—'shock' or 'collapse.'

"(*b.*) A more localized and defined disturbance of cerebral (cortical) origin—'acute hysteria' or 'hysterics.'

"2. Chronic after-effects.

"(*a.*) General nervous depression—'neurasthenia.'

"(*b.*) A more localized and defined disturbance of cerebral (cortical) origin—'chronic hysteria'"—

it is by no means uncommon in my experience for the two states—hysteria and neurasthenia—to be associated together. Both are originated by the same cause, but the symptoms due to each can usually be determined. Should there be any tenddency to hysteria, the state of general nervous depression is clearly one likely to develop and maintain the purely hysterical disorder, and it is frequently obvious that the hysterical disturbance protracts the symptoms which are really dependent on the general nervous exhaustion. To cure the one is very often the best and only means of removing the other.

Thorburn writes: "The symptoms of neurasthenia arise from a general defect in the nutrition and action of the nervous system. . . . The symptoms follow those of shock, and are the expression of an exhausted nervous system. They are generally transient, and will pass away under conditions and a line of treatment which may be briefly described as 'tonic.'" (Op. cit., p. 185.) Neurasthenia—to use the word now commonly given to the aggregate of symptoms of an exhausted nervous system—is, in my own experience, very much more common than hysteria. It is characterized by some or all, in varying proportion and degree, of the symptoms which I shall now describe, placing them merely in the order of their fre-

quency, after a careful survey of many hundreds of cases personally observed.

Sleeplessness.—The physiological value of sleep is unquestionable, whether we merely look on it as the time for rest, or as an indication that no bodily or mental disturbance is there to prevent it. Inability to sleep, wakefulness during the whole or part of the night, is a sign of considerable import in estimating the amount of injury and of shock which the nervous system has sustained. It shows that something has happened to break the most regular habit of life, and to interfere with the healthy equilibrium and function of the whole nervous system. This continued sleeplessness may be a source of the greatest possible distress to the patient. He goes to bed tired and worn, and ready to fall asleep, but no sooner is his head on the pillow than he is seized, as it were, with an unnatural and dominant wakefulness which positively prevents him from closing his eyes. Or he falls asleep, and soon wakes again, and has to pass through a night of intense wretchedness, nervous and alive to the slightest sound. The furniture creaks or the mouse gnaws. Night after night this goes on, and he tells you that if he could only sleep he is sure he would be well. And what he says is very true, for not only has there been no serious shock to the nervous system of the man who can sleep comfortably and well after a railway accident, but on the other hand also, the return of sleep, after it has been long absent or disturbed, is a very certain sign that the nervous system is regaining its equilibrium and tone. It must not be forgotten, however, that sleeplessness may be due to other causes than the original nervous shock, and that it may form a prominent complaint in those cases where convalescence is being prevented or retarded by circumstances of which I shall speak at a future page. Its value is thus to some extent impaired as a diagnostic symptom of general nervous shock from railway collision, unless it be at periods not remote from the time of accident; and, furthermore, there is frequently no means of knowing whether sleeplessness is undoubtedly present, for the reality of its existence may have no other basis than the uncorroborated statement of the patient himself.

Disturbances of the Circulation.—Disorders of the circulation, whether of the heart itself or of more peripheral parts of the circulatory system, play a no less important part in the

nervous derangement than inability to sleep, and are very commonly to be met with in cases of general nervous shock. It has been pointed out already that the shock originally showed itself by some degree of cardiac paresis, by smallness, feebleness, or slowness of the heart-beat. It is a natural consequence, therefore, that in the more serious cases of nervous shock, especially where continued mental terror and emotion tend to perpetuate the nervous disturbance, derangements of the circulation should be frequent and long-continued. The patients complain of palpitation, and palpitation from altogether trifling causes. The cardiac innervation may be so disturbed as to induce great frequency of the pulse, which may vary from 100 to 150; but far more commonly the palpitation is occasional, and it is only from exciting causes that the pulse-beat is increased. It is important to remember this in the examination of patients, for if you count the pulse only at the beginning, and omit to count it at the end of examination, you may be led to believe that the cardiac disturbance is more serious than in reality it is; and by the opposite error you may fail to discover any cardiac disturbance at all. A perfectly steady pulse throughout the whole examination tells its own tale. Nay, the rate, the character, and the excitability of the pulse form an almost metrical indication of the amount of disturbance of the nervous balance, strength, and tone; and the pulse is often the only sign there is to guide us to a right estimate of the patient's condition. It is important, however, to learn as far as possible the character of the patient's circulation before the accident, and the existence of any constitutional states or diseases, of which gout is perhaps the most common, which may give rise to functional cardiac disorder.

But while the state of the pulse may form the test of what we may call the grosser circulatory disturbances, there are yet other symptoms which are by no means uncommon. The whole vaso-motor system may be deranged; and when you hear the patient complain of alternate sensations of heat and cold, or of flushing of the face and head, or when you find that at one time his hands and feet are unnaturally warm, and at another unnaturally cold, there are evidences of disturbance in those peripheral parts of the circulatory system which are not necessarily or immediately under the same nervous influence or control as the heart itself. The functional

strength of the vaso-motor system has been weakened—it has lost its nervous tone or healthy balance; and the loss is shown by the symptoms which have been named, as well as by the occasional presence of well-marked tache cérébrale. These disorders will be referred to again, for they seem to me to have some share in giving rise to the abnormal sensations of which complaint is often made, and whose obscurity tends to cast doubt upon the *bona fides* of the man who feels them, and who can only describe them as they seem to him. With returning health and nervous tone these various symptoms disappear, although, as will be presently shown, they are liable to be maintained by those influences and circumstances which tend to retard convalescence.

Headache.—Intimately connected with the foregoing symptoms is the complaint of headache, rarely amounting to actual pain, unless indeed there has been concussion of the brain. "Pain" is so relative a term, however, that it is difficult to estimate it at its true value, depending so largely as it does upon the idiosyncrasy of the individual. More common than actual pain, or the sensation to which the word pain would be applied, is a sense of weight or oppression. This feeling of heaviness may be at any part of the head, but is most common at the back of it, over the whole occipital region. Occipital oppression or pain is, indeed, the headache *par excellence* of neurasthenia. It may be always present, or be brought on by attempts at mental occupation—by reading, talking, agitation, or want of quietude. Alcohol nearly always increases it. These sensations are doubtless to some extent dependent on the irregularities of circulation which have been named. The exciting causes of palpitation, or of alternate sensations of heat and cold, may at the same time indirectly give rise to morbid feelings of weight and heaviness in the head. Hence, also, have origin the sensations of giddiness and swimming in the head when the patient suddenly rises from the recumbent posture, sensations not uncommonly experienced by those who are first beginning to move about after serious and weakening illness. These various abnormal sensations are, moreover, largely due to the sleeplessness which is so common, and which invariably shows itself in impaired mental power, as long as the brain is deprived of natural rest. Occupation of the mind very early induces brain fatigue, and

this fatigue is revealed to the patient by pain or oppression of the head and by an indefinable sense of worry. And as long as the general prostration leads to lessened bodily activity, derangements of digestion, constipation, and the like, tend in a still further degree to make headache a not uncommon complaint of those who are suffering from general nervous shock. Bring about sleep and natural rest, improve the cardiac tone by restoration of the general health and strength, and it will be found that the headaches and the brain fatigue soon pass away.

Nervousness.—Under this heading must be placed a variety of complaints and symptoms which are very indefinite in character, and which often have no more substantial basis than the statements of the patients themselves. But they are the kinds of complaints which, in my judgment, display the alliance between the state of general nervous depression and true hysteria. Not that this association is always to be found or is always obvious in cases of hysteria, but that in this particular series the one is very much dependent on the other, owning a common cause, and possibly due to the same underlying condition of the nervous system. Complaints of being easily startled, of a sense of depression and melancholy, of trembling under excitement, of a desire to be alone and to avoid all noise, of hopelessness as to future prospects and the possibility of recovery, of agitation in the presence of others, of globus hystericus—these are often heard, and their nature is sufficiently obvious; and beside them may be placed in the same category sighing and panting, screaming at night, irritability of temper, stuttering and stammering, feebleness of voice, and the other hundred-and-one complaints and symptoms which may be taken as evidence of nervous prostration and loss of tone, of the patient having been reduced to a more or less emotional or hysterical state, wherein loss of control is a prominent feature, whether it be as cause or effect, of the strange condition in which the patient seems.

Disorders of Secretion occupy no small place in the clinical picture of cases of general nervous shock. Excessive sweating is one of the most common, and is an objective sign of wrong somewhat less vague than the subjective symptoms last referred to. It is an evidence of impaired nerve function, and is a symptom, when it occurs without obvious exciting

cause, of general weakness and prostration, and of disordered and weakened function of the nerves which control the action of the sweat-glands.

Here also, in all probability, we should rightly include those vaso-motor disturbances which, limited to special regions or tracts, may also give rise to very obvious symptoms. Of these polyuria is the most pronounced, and may be the starting-point of much future trouble with the bladder, for the frequency of micturition which it necessitates may continue as a nervous affection long after the original cause for it has been removed. Menorrhagia is also not uncommon, coming on within a few hours of the accident, and wholly independent of any normal menstrual period; and in several cases profuse diarrhœa has begun almost immediately after a railway collision. These also must be regarded as kindred signs of vaso-motor disturbance, dependent, in all probability, on some exhaustion or paresis of the vaso-motor centre—if there be but one—in the upper part of the spinal cord, or of the vaso-motor centres—if there be many—in different parts of the cerebro-spinal system. How strange and inexplicable the symptoms may sometimes be, was well shown by the case of a woman who was terribly frightened by the thought that an accident was going to happen to her child, and who was herself knocked down on the platform at a railway station. She had had polyuria some years before, and it now came on again soon after this accident. It lasted for several weeks, with one exception of twenty-four hours, during which it was replaced by an enormous flow of milk from the breasts. She was not at the time suckling. Cases such as this seem to support experimental observation as to the presence of vaso-motor centres in the cerebral hemispheres, and better to explain the intimate association of emotional and vaso-motor disturbances than if the centres lay in the spinal cord alone.

Photophobia, Asthenopia, and Size of the Pupil.—In some of the worst cases of general nervous shock we may occasionally meet with a considerable degree of photophobia. This is usually a transient symptom in the days soon after the accident, and is merely an evidence of the severity of the shock and of the need for absolute quiet. The patient finds a strong light unbearable, just as he cannot bear any loud noise. Far more common is the subsequent complaint of defect of vision,

even when there has been no damage to or near the eyeball. "I can read for a short time, and then the lines all seem to run together," the patient tells you; and he thus describes a symptom, like those which have gone before, of prostrate nerve force. The asthenopia is due in nearly all cases—whether there has previously been ametropia or not—to loss of accommodative power, a result of the general weakness and depression which render any sustained effort difficult or impossible. It is merely another sign of easily-induced fatigue; and in those persons who have neither error of refraction nor presbyopia, the asthenopia will disappear—as the general muscular fatigue and the brain fatigue will disappear—with returning health and strength. The asthenopia is precisely the same as that which is a not uncommon symptom of hypermetropia, and which may be felt for the first time after an exhausting illness or during the weakness induced by prolonged lactation. In vigorous health the accommodative power is adequate to overcome refractive error and to prevent fatigue of vision; reduce the strength, and asthenopia ensues as a direct consequence of weakened power of accommodation. It is very doubtful whether this power will ever be perfectly restored to its original strength in those who have abnormal refraction, or in whom presbyopia is either imminent or advanced. Thus you find it occasionally happen that persons, who have suffered from the shock of a railway collision, must in future years wear glasses to correct the refractive error of which they had not been conscious before. It is in these cases of induced asthenopia that muscæ volitantes are so commonly seen, and so often alarm the patient. They are of no pathological significance whatever, and as a matter of fact there are singularly few persons to whom they are not at times apparent.

The size of the pupil often affords valuable evidence of the state of the nervous tone. A widely-dilated, sluggish pupil is incompatible with a healthy tone of the nervous system, as, conversely, a small pupil, which readily varies according to the degree of light, is a rare accompaniment of exhausted nervous strength. Whatever be the physiological explanation of these facts, the size and activity of the pupil should always be taken into account in endeavoring to estimate the amount of general nervous prostration.

The Optic Discs.—At this point it may be well to consider whether, in addition to these various ocular phenomena, there is a risk of any more definite pathological change arising in the deeper structures of the eye. In my former work I entered at some length into this question, and the conclusion, drawn from my own observations and the records of published cases, amounted practically to this, that there was no evidence of pathological change being common in the cases of spinal injury and general nervous shock, such as are seen after railway collisions. I had often heard the retina described as congested—whatever that expression might mean—but I felt sure that too little account had been taken of the innumerable varieties of shade and color presented by the normal fundus in perfect health, and still more, I will now add, of the appearances produced in healthy discs when refractive errors, hypermetropic astigmatism, and the like, had not been taken into proper account in ophthalmoscopic examinations. I emphasize these conclusions now, not alone because further experience supports them, but also because the matter has been more recently and very fully investigated anew by Mr. Thorburn, to whose work the reader must refer. He is in substantial agreement with what has been said here. Thus he writes: "Slight spinal injuries are very common, but there is no evidence that they tend to be followed by changes in the optic disc. Such injuries are, however, in rare cases" (he himself having met with two only in 400) "followed by chronic meningitis or myelitis, and in the latter condition there is an *a priori* probability that optic neuritis may supervene. Both of these affections are, however, very rare, and with the exception of Dr. Clifford Allbutt's eight cases, in which we have not the material for an accurate diagnosis, there is but one recorded instance of this conjunction" (op. cit., p. 178). Furthermore, speaking of the traumatic neuroses, he says: "Here changes of the optic disc are so rare that among the numerous railway injuries which have come under my own observation, and which include many severe cases of traumatic neurosis, I have seen but one doubtful case of lesion of the optic disc." In no instance has he seen the functional eye symptoms followed or accompanied by organic changes, although examination of a few recorded cases makes it "appear that there is an *a priori* probability that the functional traumatic neuro-

ses may give rise to changes in the optic discs." These changes are indicated by transient vascular disturbance.

The sufferer from spinal sprain and its frequent accompaniment, nervous prostration, has therefore small cause for anxiety on this point; while at the same time every care must be taken that any pathological changes discovered are not the result, to use Dr. Gower's words in writing of this very class of cases, "of an affection of the mind of the observer, rather than of the eye observed" ("Medical Ophthalmoscopy," 2d ed., p. 169).

Loss of Memory.—Complaint of "loss of memory" is common, and yet the phrase is hardly an appropriate one to convey an accurate description of that which the patients usually mean by it. This so-called loss of memory is not an inability to recall the events and incidents of past life, but is rather an incapacity for sustained thought, and for continued application to the work which may be taken in hand. It is a lack of the power of volitional attention, and is an indication of easily-induced fatigue. It is not a symptom of serious import, nor is it evidence of mischief in the brain. The nutrition of the brain, as of the rest of the body, is for the time impaired, and there is failure in the power of concentration and attention. It is merely another phase of the general weakness, and of the inability to apply himself to any settled occupation, which a patient very naturally feels under the sense of weakness and depression incidental to the nervous state in which he is. That this is the true explanation is frequently shown by those who make the most complaint. They can relate every incident of the accident, and of the events which followed it, and they are perfectly accurate as to the dates of many occurrences in their lives both before and since, but they are unable to apply themselves to work, or to collect their thoughts, or even to engage in conversation.

Catamenial Derangements.—Menorrhagia has been already named as a not uncommon and immediate consequence of the nervous shock. Suppression of the catamenia, either at the moment of the accident, or as a subsequent concomitant of the general nervous prostration, is likewise not infrequent. Who shall say what determines the one or the other? The catamenia may thus be suppressed for several months—in fact, until the neurasthenical condition has passed away. At

any rate the return of the periodic flow is usually coincident with a marked improvement in the general condition. As to pregnancy, this may be pointed out as a remarkable fact, that railway collisions rarely produce abortion or premature labor —strong evidence that the concussion is not as violent as it is often thought to be, for disturbance of the uterine contents is one of the recognized causes of induced labor. But although the fear of miscarriage need hardly be entertained, it is only natural that the injured woman should feel more than ordinary anxiety as to the coming labor. As a matter of fact, the neurasthenia keeps this anxiety alive, while the anxiety in its turn keeps up, or even in the circumstances develops, the neurasthenia. Suffice it that it is very unusual for any marked improvement to be noted until after the confinement. Then follows the natural result, from joy that a man is born into the world.

The Genito-urinary System.—Every one is, of course, familiar with the risks of retention of urine in all cases of profound shock, and this should never be lost sight of in the case of persons injured in railway collisions. Unrelieved hyperdistention of the bladder may be the cause of much subsequent trouble from the atony thus induced. The general muscular feebleness, which is a marked feature of the state of neurasthenia, may also in both sexes be a further reason why the bladder is not completely emptied in micturition; and if, as has already been remarked, to these causes be added an inability to get out of bed, there is almost certain to be some residual urine—the commonest and most generally acknowledged cause of cystitis.

As to sexual matters, this only need here be said, that, as long as the neurasthenia lasts, there is not likely to be either the desire or the will. Both will return in due time, but before that time neither should be gratified, for the smallest degree of sexual exhaustion is sure to be most prejudicial to recovery. Conjugal isolation should be rigidly enforced as a matter of treatment.

The Digestive System is ordinarily much deranged. The nausea, and even the vomiting, which have accompanied the early collapse, are both prone to continue, and the patient acquires an absolute loathing for food. The bowels are costive from the confinement to bed or the house, and the tongue

becomes thickly furred. All this is obviously most hurtful to the neurasthenical state, and it has a large share in producing the wasting and muscular flabiness which are soon developed. The wasting, however, is not due to this alone. The general nutrition is interfered with because of the nervous depression, whereby the proper and requisite nervous stimulus is withdrawn from the digestive and nutritive processes. Admittedly this is theory only, but there can hardly be much question that the health and vigor of the nervous system are essential for the orderly working of every other function in the body, and the action of the nervous system in connection with the functions of nutrition and digestion is not more, nor is it less, incomprehensible than is its action in connection with the circulatory or reproductive systems. At any rate, marked general wasting is often a striking phenomenon in cases of neurasthenia, and impaired nutrition may frequently be the cause of bad sleep.

Prognosis—Exceptions to the Usual Rule.—There have thus been brought together a number of the symptoms and complaints which make up the condition to which the term "neurasthenia" is nowadays commonly applied. It is synonymous with that of "general nervous shock," which has been used so often in these pages; and though there are many objections to it, it is on the whole a convenient clinical phrase. It has at any rate no underlying suggestion as to the pathology of the condition which it is meant to indicate. Of the pathology of the varied complex of symptoms which we call neurasthenia nothing indeed is known. We say there is general depression of nervous force, a dynamic, not a structural change, resulting for a time in the manifestation of one or all of the symptoms which have been named. For a time only: because, however severe the symptoms may be, the prognosis of these cases is usually favorable; and with appropriate treatment, and the avoidance of all things likely to foster the nervous depression, there will come a restoration of the nervous strength and tone, and the evidences of its former depression will pass away.

This is the ordinary rule, but the gravity of the condition is attested by occasional, by happily very rare, instances, in which the result is different. The history of nervous shock would be incomplete were no mention made of the fact that

death sometimes ensues as a consequence of uncomplicated nervous exhaustion. No case of this kind has fallen under my own observation, but the following examples were communicated to me by a surgeon of large experience in railway injuries, the only cases, it may be said, which he had met with in a period of more than thirty years.

CASE XIV.—*Severe Shock—Death from General Nervous Prostration.*—A man, forty years of age, of exceedingly delicate physique, was in a collision at night. The accident was a slight one, and he was the only passenger injured. He was said, in the official report, to be "violently shaken," but he was able to go on home. The next day he was delirious, and on the third day he was still talking somewhat incoherently. He complained of being much shaken, and of feeling seriously injured, but there was no evidence discoverable of bodily hurt. He improved for a time, and his condition was not thought to be serious. He never seemed, however, to make any marked progress, and four weeks after the accident he became more prostrate, and greater anxiety was felt about him. From this time he gradually got weaker and weaker, and died on the thirty-seventh day. No organic disease whatever was found on post-mortem examination in any of the viscera. The lungs were greatly congested, and the cavities of the heart were distended with blood, as if death had occurred from failure of respiration and circulation.

The accident was regarded as the unquestionable cause of the death. Though moderate in character, it no doubt exercised a very unusual influence in depressing vital powers—never very strong naturally—and finally induced such an amount of nervous exhaustion as to terminate fatally, even though there were no evidences before or after death of physical injury to any one part.

CASE XV.—*Severe Shock from Fright Ending Fatally.*—The other case was that of an apparently strong and healthy girl, nineteen years of age, in good position in life, who was in a most serious collision. She received no bodily injury, but on the night of the accident she woke screaming that the engine was rushing into the room. Her illness followed much the same course, and she died in about five weeks, no struc-

tural disease whatever being found after death. The brain and spinal cord were examined in both instances.

Cases such as these are happily most rare. They are not peculiar to railway accidents, and similar examples of death from mental shock, without any organic change discoverable, are recorded in works on nervous diseases.

The Complex of Symptoms.—Taking a final view of the symptoms and cases recorded, one can hardly fail to see how indubitably all of them point to a state of lowered nervous action or tone, and that there is a weakening and depression of every function which is under nerve control. In other words, the function of every organ and structure in the body is affected. There is mental weakness and there is physical weakness; weakness of will, of attention and power of thought; weakness, or easily-induced fatigue, of the special senses which minister, both consciously and unconsciously, to the processes of the mind; feebleness of voluntary muscles and general lack of muscular tone; and feebleness of the involuntary, as shown by the character of the circulation both central and peripheral, by want of tone in the bladder wall, and by feeble peristalsis in the intestines; depression of the secretory apparatus indicated by sweating and other vaso-motor disturbances; impaired digestion and nutrition, and loss of sexual vigor—each and all bear witness to the nervous exhaustion and depression, to the wide-spread weakness which results from the nervous shock, and is expressed in the convenient word "neurasthenia."

CHAPTER III.

GENERAL NERVOUS SHOCK—(*Continued*).

I SHALL now consider some of the causes which contribute to prolong the symptoms which have been described in the last chapter, and shall endeavor to show wherein there is an alliance between the state of neurasthenia and the development of conditions which are more distinctly of an hysterical type. For although on paper it may be an easy thing, and for purposes of clear understanding a useful thing, to separate the different effects of railway collision into distinct classes, I yet entertain no doubt that neurasthenical and hysterical, or so-called functional, disorders of the nervous system are closely linked together, and are very often to be found side by side in the clinical picture presented to us. They have a common exciting cause, and both may begin at the moment of the accident, as those cases show in which an outburst of "acute hysteria," to use Mr. Thorburn's phrase, has occurred immediately. More commonly, however, the signs of hysteria are developed at a later period, and are developed, I believe, through and by the intermediate agency of neurasthenia, which, as it were, prepares the nervous system, or puts it into a suitable state, for the origination of true hysterical disturbance. The profound psychical shock of a railway collision may there and then determine some grave hysterical disorder of the emotions only, or of some more definite function, such as that of common sensation; or it may do so only after there has been sufficient time for the nervous system to reach that condition of functional weakness in which hysterical disturbances are prone to arise. Neurasthenia is that condition; and a very common sequence of events is for hysterical disturbances to be grafted on to the neurasthenical state—grafted on to it, and thereafter growing with it. I mean no more than this when I say that they are linked together, and although I have sought to convey the impression of a close alliance between the two conditions and their respective symp-

toms, I am yet in substantial agreement with Mr. Thorburn in his opinion "that neurasthenia and hysteria are distinct, and that, often as they are found in combination, neurasthenia is common without hysteria, and hysteria is at least not unknown without neurasthenic symptoms" (op. cit., p. 189).

Sex plays but a small part in the association, and although in ordinary life women are more commonly emotional than men, it is nevertheless true, that as the direct and indirect outcome of the nervous shock of a railway collision, men may become no less emotional and hysterical than women. "The frequency of hysteria in men is not fully recognized," Mr. Furneaux Jordan wrote (op. cit., p. 27) some years ago; but we all know now that a condition closely allied to, nay identical with, the hysteria of women, is commonly developed in men after the great psychical shock of a railway collision or through the neurasthenia induced thereby. I shall waste no words in academic discussion as to the use of the term "hysteria" as applied to men. When a better is invented it shall be used, but in the mean time we have to consider the why and the wherefore of the distressing condition to which a strong and healthy man may be in time reduced—a condition in which all control of the emotions is well-nigh gone; in which he cannot sleep because he has before his mind an ever-present sense of the accident; starting at the least noise; lying in bed almost afraid to move; his heart palpitating whenever he is spoken to; and unable to hear or say a word about his present condition and his future prospects without bursting into tears.

The long continuance of such a condition forms an obvious exception to the ordinary rule—to the rule, with which all are familiar in every-day practice, that convalescence is soon entered upon, and that the symptoms of the original shock become gradually less severe, and in the course of a few weeks or months glide almost imperceptibly into a state of health, so that the man is able once more to resume his business, and to engage in the pursuits of life. Convalescence, however, may be unduly delayed after the shock of a railway collision, the symptoms and their duration seeming to be out of all proportion to the injury sustained; or, convalescence having once set in, and the patient being almost well enough to resume his work, the symptoms may recur in all their severity, and the period of recovery be much delayed. What are the reasons

which conduce to this protraction of the illness, and which conduce also in great measure to delay in convalescence, when all the circumstances, the amount of injury, and the evidences of initial shock, pointed in the direction of very early recovery?

Comparatively little has been said hitherto of the bodily injuries received, and it has been assumed throughout that the causes originally at work to bring about the shock and its after-consequences were essentially psychical. The fact, however, must never be lost sight of, that there are few cases of nervous shock after railway collision, in which some bodily injury has not likewise been sustained. The mode of accident, as we have already seen, has a tendency to cause injury of the vertebral column, an injury which in the majority of cases is a simple sprain of the spinal muscles and spinal ligaments, with severe vertebral pain as an inevitable consequence. Sprains are, moreover, not unlikely to have been received in other parts of the body, even when the patient was perfectly conscious at the time that he had no blow, and not a mark is subsequently to be seen. Hence it comes to pass that from the inherent nature of the bodily injuries themselves, pain in various parts of the body—in the trunk and in the arms and legs—is very liable to come on some time after the accident, to be severe in character, deep-seated in position, and from the absence of all bruising, seemingly most obscure. Psychical causes are again at work to aggravate the patient's condition. His mental balance has already been upset by the shock of the collision, and it is disturbed still further by the onset, the character, and the obscurity of the pains which supervene. And this result is most likely to occur in those cases where the appearance of the pains has been delayed for two or three days. They renew the alarm of the injured man, his attention is thereby more closely directed to them, and their import becomes gravely aggravated in his mind. These pains, moreover, are prone to increase in severity during the first few days, and to last for a long time, and their very duration tends to maintain the exaggerated estimate which has been formed of them by the patient himself. Nor does familiarity with them lessen his alarm, for the original psychical disturbance has laid the sure foundation for an altogether erroneous estimate of the sensations which he feels. And thus you find that before very long the mind of the patient,

unhinged by the shock, and directed to the pains and other abnormal sensations of his body, tends as it were to run riot with the symptoms which he feels. Dwelling constantly on his bodily sensations, he is on the lookout for any new sensation that may arise, and is alive to and makes discovery of sensations, which to the healthy have no existence at all. Perhaps he even keeps a chart of his back or of his whole body, and marks down from day to day the precise spots where he has had some queer sensation, ache, or pain.

Is it possible that a large number of the abnormal sensations which are thus discovered, and of which patients so frequently complain while the mental balance and tone are thus perturbed, can be due in any measure to a conscious perception of the sensations of organic life? The "hysterical" condition is essentially one in which there is loss of control and enfeeblement of the power of the will, and amid the various ways in which these may show themselves, there is loss of the habitual power to suppress and keep in due subjection the sensations, which are doubtless associated with the various functions of the organic life of the individual. In the process of evolution toward a higher state of intellectual activity and endowment, man has become more and more unconscious of the sensations, which of necessity accompany the functional activity of the various organs and structures of his body. That the stomach, for example, the liver, the heart, the ovary, the œsophagus, are, as are the organs of special sense, represented somewhere and somehow, though in less degree, in the sensorium, is highly probable on *a priori* grounds, and is, moreover, established by the experiments of morbid physiological action, in originating those abnormal sensations, which may affect these and other parts by an aura at the commencement of an epileptic discharge. And if in perfect health of body and stability of mind these varied sensations play little part in the sentient life of the individual, it is because the intellectual development of man has enabled him to control them, and to allow them neither lot nor share in the sentient consciousness of active life. In the lower animal, whose brain is hardly differentiated from the other parts of its nervous system, or which has no brain at all, the organic sensations doubtless have a more important part in the economy, and probably in the enjoyment of life; but as we step higher and

higher in the scale of development, with increasing size and complexity of brain, the organic sensations have a proportionately smaller representation in the centres of intellectual activity. Let some sudden, profound psychical disturbance arise, such as may be induced by the shock and terror of a railway collision, forthwith the intellectual control is lessened, while the organic sensations declare their being, and force themselves into the conscious life of the individual. "If the nervous system," writes Sully, "has been slowly built up, during the course of human history, into its present complex form, it follows that those nervous structures and connections which have to do with the higher intellectual processes, or which represent the larger and more general relations of our experience, have been most recently evolved. Consequently, they would be the least deeply organized, and so the least stable; that is to say, the most liable to be thrown *hors de combat.*

"This is what happens temporarily in the case of the sane, when the mind is held fast by an illusion. And, in states of insanity, we see the process of nervous dissolution beginning with these same nervous structures, and so taking the reverse order of the process of evolution. And thus, we may say that throughout the mental life of the most sane of us, these higher and more delicately-balanced structures are constantly in danger of being reduced to the state of inefficiency, which in its full manifestation is mental disease" ("Illusions," p. 122).

And thus it is, it seems to me, that when by the profound shock of a railway collision the "higher intellectual processes" are thrown *hors de combat,* these organic sensations, which, as the same writer says, "constitute for the most part in waking life an undiscriminated mass of obscure feeling, of which we are only conscious as the mental tone of the hour," and which form "'as the vital sense' an obscure background for our clear discriminative consciousness, and only come forward into this region when very exceptional in character" (ibid., pp. 148, 149), step out of their natural obscurity, and become the foci of the uncontrolled and misdirected attention of the mind. (The reader will find some interesting and philosophical remarks on the subject in Dr. Mercier's able work, "Sanity and Insanity," pp. 85–94, 1890.)

Not one of the abnormal sensations has any organic lesion

as its basis, but that there is some physical substratum seems highly probable. Continued disorders of the circulation are the most obvious after-signs of shock, and it is not at all unlikely that many of the morbid sensations which form the burden of the patient's complaints have a real, not an altogether imaginary, basis in transient flushing, or in transient anæmia, of the affected part. Some such cause as this must be at the root of many of the sensations which afflict peripheral regions of the cutaneous surface, and not improbably of those also which are felt in the central or in more vital parts.

And as the mental state may be influenced and deluded by the abnormal sensations, so in an even greater degree may these be affected by the mind. The results of attention, of anxious attention concentrated on a part, are seen in their most aggravated forms. Pain and other morbid sensations are thus made more acute and more oppressive; they become more dominant in the mind, and less under the control of the already weakened will. Small wonder that the patient, alive to every new sensation which may arise, should tend to exaggerate its import, to describe it in terms which to the healthy man seem almost absurd, and that exaggeration should be a pronounced feature of the morbid state which is called hysteria, no matter which be the sex affected.

And out of this very exaggeration itself arises another cause of prolongation of the illness. The exaggerated estimate of the symptoms themselves leads to an erroneous estimate of the present incapacity, and to an increasing belief in the impossibility of future recovery and usefulness. Hence it is only natural that differences of opinion should arise between those who are entitled to receive compensation for the injuries and for their prospective consequences, and those who have to provide it, and who take a wholly unsentimental view of the value of the patient's health and life. Months perhaps are thus wasted in disputing about the claim; or, worse than this, the man is drawn unwittingly into litigation, and is subjected to the anxieties and worries which a lawsuit involves. What surer means than this for aggravating his symptoms? Is recovery possible under such an influence; is there not, indeed, every likelihood that the symptoms will get worse and worse, or at best will undergo no change, and is it not more appro-

priate now to call them "litigation symptoms," than those of general nervous shock?

And herein also lies the explanation of the great majority of those cases where improvement has advanced to such a stage that return to work seems on all hands desirable, and yet nevertheless when work is suggested or attempted improvement stops; and even in some instances the patient seems from that very moment to fall back and to become worse than he was before. For, as a matter of fact, it is very rare to find the patients return to work while the question of compensation, and the possible disputes attending it, remain unsettled. Now and then you may meet with a patient, over whose plans and resolves the time and matter of compensation have little influence, who returns to his business with every benefit to himself at the moment when he has sufficiently recovered to do so. Such instances, however, are the exceptions to the rule, and occur probably in those only whose mental balance has never been very seriously upset, in whom the symptoms of general nervous shock have not been severe, or who have the good judgment not to allow these matters to weigh upon their minds. The experience of hosts of cases establishes this fact, that patients will not, or cannot, make the necessary effort to resume work so long as the settlement of the pecuniary claim has been uneffected. And thus, in addition to the worries and anxieties of litigation and dispute, there arises another very potent cause for continuance of the symptoms, and for inducing a state of chronic invalidism, which is far more dependent upon the circumstances of the moment than upon the original nervous shock received. This cause is the want of occupation. Can anything be worse for a man—is there anything more likely to lead to irritability and fretfulness, to sleeplessness and loss of appetite, to nervousness and anxiety about himself, to hopelessness as to the future, to a lack of power to concentrate his attention upon anything which he may have in hand—is there anything more fitted to disturb the relation between the *mens sana* and the *corpus sanum* than want of healthy occupation? And when this goes on for months and months, each month more wearisome and more wasted than the one before, is it to be wondered at that the picture which these patients present is often lamentable indeed? Still more wretched is it likely to become

if, in addition to the want of occupation, the patient has remained altogether in-doors, and has been deprived of the good which healthy bodily exercise might have done him.

Make all the allowance that may honestly be made for the special circumstances of terror attendant upon a railway collision—and I would not for a moment seek to lessen their real influence—and compare the state of one waiting for compensation, whom for the nonce we will call a railway patient, with the state, as nearly similar as may be, of a hospital patient who has had no compensation to look forward to, and who has been compelled to resume his work as soon as he was able, and then see how different is their lot, and how infinitely less wretched is the one man than the other. The hospital patient has long ago been well, while the railway patient has been waiting, for months it may be, until compensation has been paid him, verily believing that he could not return to work and to a natural and more healthful mode of life. "Settle your claim and get to work," is the best advice which can be given a man in these circumstances. Get to work and you will soon find you have the strength for it, and will forget the gloomy prognostications of those who say that you never can tell what may happen after a railway accident, and that you ought to wait and see how things turn out.

Quite apart, however, from these various causes, the condition, life, and habits of the patient before the accident have no small share in determining the severity of his symptoms and the rate of his recovery after it. It is evident that the man who has been in feeble health, or who is in a state of convalescence from some recent illness, is likely to present the symptoms of neurasthenia in an extreme degree; as also does the man who, although in perfect health, has been living a life of hard and constant work at the high pressure which everyday competition entails. He has an extensive business, with numbers of subordinates, and wide-spread interests in connection with it, which he must himself look after, and which he cannot delegate to another. He has been in good health, but this has been his life, and he has had no holiday for the past five years. He is much terrified and slightly shaken in a collision. He does not know he has been hurt, but not many days go by before he is completely prostrated, unable to eat or sleep, and feeling thoroughly ill. His business still compels

his own attention, and so perhaps weeks go by before his obviously broken health and unfitness for work necessitate complete rest. It is difficult to say how he could have acted otherwise, but all the circumstances conduce to make his illness a long one, and to delay the period of convalescence and recovery. For however good his health may have been to all appearances before the accident, his nervous system was in such a state of tension that it was likely to give way unduly from an adequate exciting cause. This is the unvarnished story of an actual case, and there are numbers like it. So, also, we may find a nervous system ill prepared to bear the brunt of a railway shock in those of intemperate habits—habits of intemperance not in matters only of food and drink, to which the word is supposed commonly to apply, but habits of intemperance also in regard to the sexual desire. This is in my judgment a far more powerful predisposing cause of the neurasthenical state than errors in diet and alcoholic excess. At any rate, such causes as these must be borne in mind if we would seek for the reason why the symptoms are severe or are being unduly prolonged. Treatment is little likely to be of use unless they are recognized and put out of the way.

It is a striking fact that in cases where there has been serious injury to limb, such as simple or compound fracture, even if at the time of the accident the collapse was extreme, it is most unusual to meet with the protracted after-symptoms, which have been described as due to general nervous shock.

Case XVI.—*Severe Bodily Injuries—Absence of Prolonged After-symptoms of Shock.*—A man, aged forty-seven, was in a very bad collision at night, and in addition to severe bruises and burns about the face and body, he had a simple fracture of one fibula, and a compound fracture of both bones of the other leg just above the ankle. There was naturally great collapse, but he rallied in the ordinary way and did well. Six months after the accident his general health was good; he was well nourished, he had no nervous symptoms, his pulse was quiet, and sleep and appetite were both excellent. Nor were there any after-symptoms, for at the end of five years he was reported as feeling no ill effects whatever from the accident, save a little pain and stiffness in the ankle when the weather was cold. Never at any time were there neurasthenical symptoms.

What is the reason that in a case such as this, and in others like it, there should be so marked an absence of the after-symptoms of general nervous shock, when originally the collapse was very severe? In psychical conditions lies, I believe, the explanation of this seeming anomaly. In the very definiteness of the injury there is something on which the mind of the patient can dwell with a certain measure of satisfaction, for, as far as he knows, the usual result after fracture is perfect restoration of health and bodily usefulness. The collapse subsides, and the patient finds himself with an injury not more obscure, it may be, than that of a broken leg. He knows that he has been doomed for a time to his bed, and that as soon as he is allowed to be up he will begin to move about again and to get well. The injury is definite and precise, its symptoms are obvious from the moment it was received, it lacks the seeming obscurity that is a feature of those symptoms which only supervene after several hours or days, there is probably less pain as time goes on, and all the circumstances combine to induce a repose of mind, which is absent from the commoner cases which have been considered. And there is also the necessity of complete bodily repose from the moment that the patient can be placed in bed. The enforced rest is good both for body and mind. Confinement to bed at an end, the patient is only too thankful that he is able to move about again, and gradually begin to walk. Returning strength goes hand in hand with returning possibility of exercise, and there is less excuse for staying in-doors because of the fear that the after-consequences of some wholly obscure injury may turn out very serious. There is, moreover, less likelihood of dispute arising as to compensation, and the money calculation becomes all the easier and the readier, because the nature and extent of the injury can be definitely appraised. Thus the absence of the symptoms of continued nervous shock in cases of bodily injury, where the amount of true collapse may have been originally severe, throws light on the symptoms which the more ordinary cases present, and tends to support the view that those symptoms are due to mental causes rather than to the bodily injury or to any vibratory jar sustained.

And how largely the continuance of the symptoms is due to mental influences is shown, perhaps even more conclusively,

by the speedy recovery which often ensues, when the exciting causes of the symptoms are removed. It is all very well to say, it is a diagnosis easy enough to make, that so-and-so, who recovered as soon as his claim was settled, was shamming, and that his symptoms were altogether untrue or wilfully exaggerated; but this will hardly suffice in explanation of the symptoms which have caused so much anxiety and trouble, and have been so little amenable to treatment. Suspense is at an end, and there is nothing any longer in the way of his making the requisite and successful effort to resume his work. "How long I have been ill, how little I improve, how small seem the chances of my recovery," have been the uppermost sentiments in his mind, and they speedily give way to this one, which is wholly different and far more hopeful, "How soon shall I be well?"

It remains to be considered to what extent recovery is possible in these cases of nervous shock, and how far the patient regains the mental and bodily vigor which he had before the accident. Happily the record of cases known to me is conclusive upon this point, that recovery is usually complete, and the patient is able to resume his occupation and to carry on his business as well as he did before. There are, of course, exceptions to the rule, exceptions which show that some alteration has taken place in the bodily physique, and very possibly in the mental vigor also. Thus you may hear that the man is less able to bear prolonged fatigue, either bodily or mental; that he is more susceptible to the influence of alcohol, more irritable and easily excited; that he lacks that complete self-control which he may formerly have had in his business relations with his fellow-men; that he is nervous when travelling, is afraid to ride or drive, and has been compelled to give up his hunting and shooting; that he is a more nervous man than he was before, and more subject to headaches; and in the severer cases, that his hair has turned gray, and he looks prematurely aged. Some years have been added to his life, and he is never quite what he was before.

And here very appropriately arises this important question, How far does the course of the protracted illness, apart from the nature of the original injury and shock, conduce to imperfect recovery hereafter? Remember that the symptoms have been largely those of emotional disturbance, that loss of

control and feebleness of will have been at the foundation of many of them, and there can be little doubt that an unconscious or wilful yielding to every sensation that may arise, the abandonment of the conscious self to the thraldom of the morbid state, the enjoyment, so to speak, of the luxury, not of woe exactly, but of gloomy forebodings and feelings and fears, pave the way for the impossibility of regaining, even in the best of circumstances, that complete mental stability and continuous self-control, which are the happy appanage of perfect bodily and mental health. A vicious habit is being impressed upon his nervous system, from which the sufferer will find it difficult to rid himself. If he thus allows the various influences conducive to the morbid state to have the mastery over him for weeks and months, because he thinks it better to "wait and see how things turn out," unable, or making no determined effort, to resume his natural occupation and mode of living until some wholly impossible compensation has been received, depend upon it he will suffer in the future. Or worse than this, if he keeps up the morbid state by wilful means, his moral and his physical nature are subjected to a long spread-out shock, from which it will be hard to rally. As he sows so also shall he reap.

CHAPTER IV.

THE FRIGHT NEUROSES—TRAUMATIC HYSTERIA.

I PROCEED, in the next place, to the consideration of a class of cases to which the name "traumatic hysteria" is now very commonly given. In my former work they were dealt with as examples of so-called functional or neuromimetic disorder, and although I shall still have to insist that that is their essential nature, the term traumatic hysteria has come into such general use in more recent years, that though I should prefer to call them the "fright neuroses," I intend to adopt it here. Objection has from time to time been made to the use of the word "hysteria" because of its etymology, and still greater have been the objections made to it when in company with the word "traumatic." Nevertheless I doubt very much whether it will ever be possible to get rid of the word hysteria, or if we should gain much by doing so; and if it be ever used to signify the nature of the symptoms presented by nervous disturbance occurring in the male, there is, I venture to think, no insuperable difficulty in so using it without thinking of the womb. Nor can any reasonable person doubt, after perusal of the works of Charcot, Oppenheim, Strümpell, Guinon, Thorburn, Dreschfeld, Weir Mitchell, and many others, that hysterical disorders are prone to follow and to be the result of injury. No better phrase for their description has, as far as I know, been suggested than "traumatic hysteria," and I suppose there is not a single neurologist of experience or repute, who nowadays will be found to deny that the gravest disturbance of nerve function, to which the term hysteria is more or less applicable, may be met with in the male sex, and be the result of injury. Examples will be given here in support of this contention, but if any one doubts the possibility of hysteria in the male, let him turn to the authors who have been named, and there he will find unquestionable instances which will surely carry conviction to his mind.

Do not let it be thought, that in speaking of symptoms as hysterical or functional, there is any desire to minimize their importance and it may be their gravity. Far too often, it is true, the symptoms of nervous disorder have been placed in the category of hysteria, and been forthwith regarded as of small concern; but it may be questioned whether the treatment of a case has ever been found much easier because of the diagnosis of hysteria, and it is tolerably certain that we are not much nearer the correct understanding of its nature because it has been so described. That has never been my own feeling with reference to the so-called functional disturbances of the nervous system, which are common after railway accidents. It has always been my opinion that some material and morbid change must underlie the nerve disorder, but it seems to me most unlikely that such change can be of the same nature as the coarse pathological lesions, which we are wont to see in the post-mortem room, or which are shown us by the microscope. For all we know the change may be a chemical one, and the nervous disturbance be altogether secondary. The course of the symptoms themselves, and their rapid and often very sudden disappearance, form well-nigh conclusive evidence that they cannot be due to gross pathological lesion. Nevertheless, if, at the present day, we are unable to say what is the precise morbid change underlying the so-called functional disorders of the nervous system, and must acknowledge with Guinon that, as far as known pathological lesion is concerned, they are disorders *sine materia*, we are not debarred from their clinical study; nor is the hope denied us that a close observation of the symptoms displayed may lead in time to a knowledge of their pathology, whether the change be in the affected parts of the nervous system themselves, or in their nutrition and blood-supply.

From the clinical point of view, then, we may take it as an accepted fact, that fright is a common and powerful determining cause of the onset of hysterical phenomena, and it is that element in them which makes railway collisions so fertile in functional neuromimetic disorders. Apart, however, from the immediate effects of fright, which is not always or in all cases followed by injurious consequences, there are certain predisposing conditions in the individual which have to be considered. The constitution of the nervous system may be

itself at fault, either because of inherited instability, or as the result of causes which have had injurious influence upon it. Inherited weakness may show itself in what is called a nervous temperament, such as may be obvious even to superficial observation, or as may be brought to light only by illness or disease. We all know how very variable are the effects of illness upon the nervous system, and how often it happens that those who are free from any trace of nervousness during health reveal their nervous temperament when ill. And even if the hereditary instability has never been manifested in themselves, the family history may afford strong grounds for suspecting it. (In his classical work on hysteria ["De l'Hystérie," p. 24] Briquet records that in only ten out of 396 women subject to hysterical disorders could he discover no evidence of predisposition. Thorburn, Oppenheim, and others, however, have had a somewhat different experience, and do not regard hereditary predisposition as so common.)

Moreover, in addition to the hereditary predisposition, there are predisposing causes incidental to the individual himself. Severe illness and the consequent weakness, sexual excesses, overwork of body or brain, alcoholic intemperance, the gouty diathesis with its chronic mal-assimilation and impaired nutrition, the existence of some definite nervous disease—all these things and many others predispose a person to suffer from the great mental shock which appertains to a railway collision, and to almost every serious accident whether by land or sea. For more detailed information on the manifold predisposing causes of functional nervous disorders, the reader may turn with advantage and profit to Georges Guinon's recent work, "Les Agents provocateurs de l'Hystérie." He will there learn that many of these disorders arise, not so much as the result of an immediate cause, but from the state of the nervous system being such that an exciting cause is able to provoke it to the manifestation of functional disorder. It is in this way that railway accidents very often lead in time to functional nervous disturbance, in that by them there is induced that condition which has been dealt with in previous chapters, and to which the term neurasthenia has been applied.

It seems, therefore, an almost natural step to pass from the consideration of general nervous shock to the consideration of the cause of nervous mimicry and traumatic hysteria,

because the shock has been, in many instances, the means of inducing that very condition of the nervous system, which predisposes to the manifestation, and underlies the origin, of these functional nervous disorders. The cases which will be quoted, moreover, show that in the worst instances there is frequently some evidence of mental disorder in the previous history of the patient himself, or that he comes of a stock in which mental or emotional disturbances and peculiarities, not necessarily amounting to insanity, have been recognized as prominent in the family record. It has been impossible in every case to obtain evidence of the kind, but, in the absence of discoverable predisposing tendency, there is a sufficient cause for the origin of the hysterical disorder in the profound nerve exhaustion, prostration, disturbance, or whatever we may like to call it, which the moral and physical shock of the accident and its varied consequences have had upon the nervous system. We need not seek further than this for a cause of the functional disorders — the paralyses, the spasms, and the convulsions — which are mimicries of grave disease.

We may now consider in greater detail the different varieties of hysteria which are the result of injury. In the first place, and of infinitely less moment than those which have to be spoken of presently, are the convulsive sobbings, cryings, and laughter of acute hysteria, such as may come on immediately after or within a few hours of the accident. Every one is familiar with these sorts of attacks, and I say they are of comparatively small moment, because they are usually transient. They very probably give relief to nervous tension, and are thus productive of good; and experience tells that they are not followed by, or commonly associated with, those hysterical manifestations, which, copying the symptoms of real disease, are more determinedly fixed in, and are with greater difficulty eradicated from, the disordered nervous centre. They lack that fixity which is one of the most serious and troublesome among the characteristics of hysterical disorder of the chronic, as distinguished from the acute, variety. The prognosis is distinctly more favorable, and I shall say nothing more about them than this, that they are to be met with in both sexes in almost equal degree, and that it is of importance to insure perfect quietude and to avoid all reference to the

exciting cause of the hysterical seizure. Condoling friends had better keep out of the way.

Passing, therefore, to the more chronic, rarer, and more imitative forms of traumatic hysterical disorder, the multiplicity and variety of the symptoms, and the very nature of hysteria itself, render it impossible to draw up any comprehensive classification. Suffice it that the symptoms very commonly consist of disorders of motion and sensation; paralyses or contractions of a limb; diminution or other impairment of common and special sensation; convulsive epileptiform seizures; vaso-motor derangements; and more markedly psychical troubles. The varied symptoms are, I think, best studied in the record of individual cases, but I propose in the first place to say something as to the possible origin and nature of some, at any rate, of the symptoms which may be seen. In my former work I expressed my "belief that the primary seat of functional disturbance lies in the brain itself, and that, as in the hypnotic state induced by a profound mental impression, there is a temporary arrest in the function of that part of the sensorium which presides over and controls the movements and sensations of the periphery." There can, I think, be no question that the underlying cause of the neurotic symptoms, even of such as "functional paraplegia," is to be found in the cerebral cortex. The disorder has had its beginning in profound mental disturbance or shock, and the presentation of the symptoms seems to direct one entirely away from the periphery of the nervous system in search for an explanation. In paraplegia from organic disease, other than that of absolute destruction of the cord, the loss of motor power and of common sensation is rarely absolute, and the patient, at any rate, is only too anxious to show how much power of movement he has. In functional paraplegia, on the contrary, the paralysis is usually absolute, nor can any movement be elicited at all. The thing at fault is obviously the power of initiating movement. The mandate from the brain is in the one case checked by lesion in the cord, beyond which it makes its way with difficulty. It makes it, however, and some movement is the result. In the other case the mandate never leaves the cerebral cortex at all—no impression reaches the limbs, and there is no movement. When we come to consider individual cases, we shall see the same sort of defective power of the

cerebral cortex in initiating movement in such a simple act as that of putting out the tongue. Asked to put out his tongue, the patient is wholly unable to do so. Vigorous effort is made —the facial muscles and the muscles of the trunk and limbs are called into play as if they could determine the result; and the result is entirely abortive, or the tongue perhaps reaches no further than the teeth or lips. But if such a patient be carefully observed, it will be noticed that there is no impairment whatever in the movements of the organ itself: speech is unaffected, and if by any chance the automatic and involuntary act has to be performed of removing a particle of food from the outside of the lip, out goes the tongue in a perfectly natural way. This was a striking phenomenon in one of the cases to be presently recorded, in which there were symptoms of functional neurosis, such as we may conceive could not possibly be feigned; and it is the presence and coexistence of such other symptoms which enable us to establish it as tolerably certain that these defects in motor power are not fraudulent, but are likewise due to a real inability on the part of the patient to call his cerebral centres into the activity requisite for the particular movements desired. It may be difficult or impossible, mere conjecture, to say wherein the cerebral defect lies, but there seems to be neither more nor less difficulty in the case of sensory, than there is in the case of motor disorders. Both are alike inexplicable; but if defect of the will power of the higher cerebral centres be indicated by inability to perform desired movements, is it altogether inconceivable that the same cause is at work in the abolition of common sensation and in impairment of the special senses? Automatic movements continue unimpaired, purposive desired movements are those alone which fail; and it has often occurred to me when in the presence of a case of functional anæsthesia, that the loss of sensation may be quite as much a phenomenon of the moment, as is inability to put out the tongue a phenomenon of the moment when that particular and specific act has been desired. May not sometimes the very examination of a hemianæsthetic patient largely determine the hemianæsthesia, which forthwith disappears as soon as the examination is at an end? Common sensation, for all we yet know, may be quite as much both voluntary and automatic as is the power of ordinary movement; and although

we talk about a patient not choosing to do this or that, the psychical condition which determines his inability to put out his tongue may equally determine his inability to feel, and the loss of the one power may be as much, or as little, dependent on the brain activity which we call Will, as is the loss of the other. At any rate, both defects have a common exciting cause, and that is the state resembling hypnosis which is induced by fright.

We know how great is the part played by "suggestion" when the patient is in the hypnotic condition, and how it may lead to the manifestation of various motor and sensory disturbances. The examination of a patient may, therefore, it seems to me, sometimes provide the suggestion whereby anæsthesia results. Looked at in this light, suggestion and expectancy are very much the same thing; and underlying each, whether the same or different, is an abnormal, and, for the time, unhealthy condition of the higher cerebral centres, whereby a change is brought about in the ordinary relations of mind and body. Let it be granted to the full that the severe psychical disturbance of an accident, in which there has been reason for fright, is responsible for all the evil consequences which ensue, yet I have little doubt that the resultant symptoms are not altogether independent of the method of procedure which is adopted for discovery of the symptoms present or expected. To take a specific instance. If it became the custom to test forthwith the sensation of every person who has been injured in a railway collision, we should presently find the opportunities of studying hemianæsthesia enormously increased; much as in the same sort of way, when it was the custom to examine everbody's spine, injured or no, complained of or no, spinal tenderness and surface hyperæsthesia of the back were very much more common than they are at the present time. This is no merely idle speculation. Those who have had the opportunity of seeing large numbers of cases of railway injury cannot help observing how much there is of fashion in the symptoms which are seen, and a word of warning is not, in my judgment, out of place to-day.

Students of the works of Charcot know how close in his judgment is the alliance between many of the phenomena of hysteria and those which may be purposely induced in the hypnotic state. Recognizing the ease with which many con-

ditions, such as palsy or contracture of a limb, for example, may be developed by oral suggestion during the hypnotic sleep, he sees a close analogy between the origin of those phenomena and the origin of many of the phenomena of traumatic hysteria. In place, however, of oral suggestion, it is the injury which suggests the special form of neurotic disorder, and traumatic suggestion takes the place of oral suggestion in hypnosis. But as oral suggestion is followed by the desired result only when the higher regions of the cerebral cortex are in the hypnotic state, so traumatic suggestion has no influence unless the centres are in a condition allied to that in which they can be put in hypnosis. The circumstances in which the injury was sustained provide the requisite condition. Speaking of railway collisions, he says that nervous troubles often occur in such cases apart from any traumatic lesion, and simply as a result of the psycho-nervous commotion produced by, yet frequently not appearing immediately after, the accident. It is the state induced by the psycho-nervous commotion which renders traumatic suggestion possible. Turn to one of his most typical cases of hystero-epilepsy ("Diseases of the Nervous System," Vol. III., 1889, New Sydenham Soc., tr. by Dr. Savill, p. 226 et seq.), where all the prolonged symptoms had had their beginning from a severe cut on the arm, on the receipt of which the patient had fallen to the ground with hemorrhage and fright. Was the wound, he asks, sufficient to provoke the development of the nervous symptoms? No, he answers; and he would have us bear in mind that "along with the injury there is a factor which most probably plays a much more important part in the genesis of these symptoms than the wound itself. I allude to the fright experienced by the patient at the moment of the accident, which was betrayed shortly afterward by a loss of consciousness, followed by a sort of transitory paralysis of the lower extremities." The same nervous condition, which formed the psychical substratum of the hystero-epileptic phenomena in that instance, exists in all probability in those cases where some trifling injury, in the neighborhood of a joint, for example, has led to palsy, contracture, or anæsthesia of a whole limb, or to the physical signs and symptoms which imitate disease of a joint. The injury was the cause of some abnormal sensation which in a healthy nervous condition would have been totally

disregarded, but which to a nervous system, the victim of psycho-nervous commotion, fright, or mental shock, becomes suggestive of serious wrong. This, in other words, is "traumatic suggestion," and having expressed similar views in 1883, I am now in full accord with Charcot when he says that in railway collisions a "peculiar mental condition is often developed, which is intimately connected, in my judgment, with the hypnotic state. In both of these conditions, in fact, the mental spontaneity, the will, or the judgment, is more or less suppressed or obscured, and suggestions become easy. And thus the slightest traumatic action, for instance, directed to a member may become the occasion of a paralysis, of a contracture, or an arthralgia. It is in this way that one so often sees after railway accidents cases of monoplegia, paraplegia, or hemiplegia simulating organic lesions, although they are no other than dynamic or psychical paralyses, very analogous, to say the least, to hysterical paralyses." This condition, so closely allied to the hypnotic state, may be developed by the nervous shock, but I believe that it may be the result also of the neurasthenia which the nervous shock has initiated.

It is in such cases that the term auto-suggestion is, I think, more appropriate than traumatic suggestion to indicate the origin of the nervous phenomena. Nevertheless, there is no material difference between them. The thing essential for suggestion to have any influence is the special psychic state, induced immediately by nervous shock or through the intermediate agency of the general nervous depression, which, for the sake of brevity, we call "neurasthenia." And in many other ways than in affections of the limbs and joints, auto-suggestion has, in my opinion, much to do with the origination of symptoms which are clearly of the nature of hysteria. That some form of local paralysis should be a very frequent result of suggestion is not a matter of surprise, when we remember how very commonly local injuries, and local injuries of no great severity, as has been previously pointed out, are met with by the sufferers in railway collisions. The sense of heaviness and numbness which follows a blow, more especially if in the excitement of the moment the person has been unconscious of having been struck on any one part, is very likely indeed to suggest the notion of paralysis. It is astonishing how often after a railway accident one hears the fear of pa-

ralysis expressed, and has to recognize how very real this fear may be to the patient, and how difficult it is to eradicate it from his mind. There is much truth in Mr. Thorburn's remark (op. cit., p. 219) that "in the case of railway accidents, at any rate, the general public of this country has been educated to expect 'concussion of the spine' with paralysis, and that, in the minds of the laity, the very mention of a railway accident calls up the required idea." If the reader will recall what has been said as to traumatic lumbago, and the symptoms which frequently accompany it, he will have no difficulty in appreciating Mr. Thorburn's remark; nor will he find cause for surprise that hysterical affections of the spine should be common after railway collisions, having as their basis the fascial and muscular injuries which have been described.

Touching on the subject of hypnotism, the same writer sees an alliance to it in the unconsciousness of which patients often speak, as having affected them at the time of the collision. It is a familiar fact that a period of transient unconsciousness, or a period, at any rate, in which there is no conscious impression of events, is by no means uncommon, even when those who tell of it have had no blow upon the head, and there has certainly not been concussion of the brain. I have myself regarded this as a dazed condition, the result of fright, and have never thought it strange that some persons should have been wholly unable to give any account of what transpired, or what they themselves did after a collision, when one bears in mind how terrible may be the accompanying events of a severe collision, and how vast and appalling is the contrast between everything before it and everything after. Mr. Thorburn, however, goes further than this, and is inclined to regard this state of daze as of the same nature as the state of hypnotism, and thereby he finds an explanation of the many strange and unremembered acts of persons thus affected, and of the imaginative and altogether incredible stories which they may tell of what befell them, but which they themselves, nevertheless, implicitly believe. He records examples of this nature, to one of which I may refer here, because it is the history of a man known both to Mr. Thorburn and myself, and because there was no question of compensation to throw doubts on his veracity.

"A gentleman while travelling with me," writes Mr. Thor-

burn, "allowed the train in which he should have proceeded to leave a side station without him. Seeing the train already started, he ran after it, attempted to get on, and fell on the line, sustaining fortunately no serious injury. He afterward described minutely how he had tried to get on to the third carriage from the rear of the train, but failing, had fallen behind it, and how the remaining coaches had then passed over him. To this account he always adhered, although several railway servants who saw the occurrence noticed that he jumped at and missed the last carriage, and fell behind the whole train, nothing passing over him."

Clearly in this instance there was the psychic state in which auto-suggestion might have played a part in the development of some symptom of traumatic hysteria had there been any local injury to determine it. This is what happened in the case of one of Charcot's patients, the history of which is recorded in the appendix to his lectures. Omitting many of the symptoms, it may be said that this was a case of paraplegia following an injury, severe contusions to the thighs and lower abdomen, which the man described as having been caused by a heavy van passing completely over him. The occurrence, as he believed it to have taken place, came before him often in his dreams; but it was known, as a fact, that he had not been injured in this way at all, but that he had been violently knocked down on the footpath while he was drawing his barrow. He lost consciousness immediately, remained comatose for several hours, and afterward for two or three days was in a state of intellectual torpor, in the condition suitable for the efficacy of suggestion. And the suggestion here was made by the abnormal sensations in the limbs which were the consequence of the local injury. The mental condition which this man presented is precisely that which, in varying degrees of duration and severity, may be induced by the profound psychical commotion of a railway collision. In it the affected person may do things of which he has no subsequent recollection, he may be led to believe that things happened to himself which are altogether contrary to fact, and any local injury may thereby be made the starting-point, through suggestion, of some definite hysterical disorder.

The all-powerful influence of psychical commotion and emotion is the very root and foundation also of the teaching

of Oppenheim, in his short but most valuable work on the traumatic neuroses ("Die traumatischen Neurosen," Berlin, 1889). The physical injury, he tells us, is only in part aswerable for the consequences which follow. "Die Hauptrolle spielt das psychische: der Schreck, die Gemüthserschütterung." His cases were mostly those of hospital patients, and although they were regarded from a somewhat different point of view, in that he looks on the symptoms of each case as indicative of a more definite psycho-neurosis, yet this author is in practical accord with what has been written in the last chapter. It was there insisted that the psychical disturbance was the reason why the pain of some trifling injury became so magnified as to suggest all sorts of grave and enduring disorders. The injury has, of course, as Oppenheim says, a direct result; but as a rule this is of small and transient moment, unless the mental disturbance should alter its usual character and impress on the bodily disorder the features of a lasting disease. The influence of fright at the time of the accident is so great as to induce a long-continuing psychical disturbance, and this it is which determines and governs the phenomena of the traumatic neurosis. A very careful study of his writings leads me to the conclusion that there is no very great difference between the views of Oppenheim, and those which have been advanced by myself. He lays greater stress, perhaps, on the psychical element in the neuroses and less on that of nerve prostration, but both, it must be remembered, are neuroses of traumatic origin.

"Die Hauptrolle spielt das psychische: der Schreck, die Gemüthserschütterung."—The whole sensorium, apparently, may be thus affected, and may pass into a state of slumber, as is shown by mental hebetude, by lessened volitional power, by anæsthesia and analgesia, and, on the other hand, also by excessive activity of the lower automatic centres from lost or torpid cerebral control. The abnormal condition is allied in all probability to that of the hypnotic sleep, and it is, moreover, akin to it in the readiness with which the symptoms may pass away when the requisite stimulus has aroused the brain from its torpid state. The stimulus may be some profound mental or bodily impression; it may be exerted only by the more tedious influence of re-education of the movements of the affected part; but in either case the activity of the sensorium

is once more alert, and the cerebral control can be exercised in its normal and healthy way. Not less mysterious than slumber of the sensorium, whether it be of the whole or of a part, is the fact that daily familiarity with the morbid process seems to give the individual patient the voluntary and more facile power of putting the affected region of the sensorium into the state of torpor, or of voluntarily abandoning himself to the easily-induced influence of the abnormal condition. Repetition and perpetuation of the morbid condition of the sensorium make the symptoms easier of production than they were before. The man who has once been hypnotized can be more readily hypnotized again, and thus it is that in course of time the "medium" of the mesmerist or of the so-called spiritualist can be reduced by the most trumpery and frivolous influences to the hypnotic or cataleptic state, and so becomes the most pitiable of mortal men.

It has been said already, in speaking of the symptoms of general nervous shock, that the man who voluntarily abandons himself to the morbid state submits both his moral and physical nature to a long spread-out shock from which he will find it hard to rally, and the same remark may be here reiterated with even greater force in connection with the functional disorders which are results of the unnatural nervous state. For there can be no doubt whatever that many neuromimetic conditions are more or less under the voluntary control of the patient; and that, as may be seen in cases of convulsion, the mimetic seizures—in themselves typical in character—may be brought on by the will of the patient himself. And this can be done with greater ease as time goes on. Herein lies the explanation of those happily-timed convulsions which occur when it is most important that you should see them, and should be impressed by their severe reality. The seizure itself—*qua* seizure—is typical of its kind, and its phenomena lie outside the conscious control of the individual. But within his control has been the commencement of the seizure at the precise moment when it began. Thus, in speaking of the ease with which the hypnotic state may be induced in those who have been often hypnotized, Heidenhain writes: "Many of the gentlemen upon whom the above experiments have been made, need only to sit down, close their eyes, and think intently—other thoughts being excluded—that the hypnosis is coming

on, in order to, as it were, voluntarily submit themselves to the charm" ("Animal Magnetism," p. 86). And, as of the hypnotic state, so of other neuromimeses also, the patients may voluntarily submit themselves to their exhibition, and the manifestations thereof become in themselves not less real. The existence of a certain amount of control is shown, moreover, by the disappearance of the mimicries, when all cause for their representation is removed. The matter of compensation, as we have seen, exerts in many cases a very favorable influence on the symptoms of general nervous shock. It does so in these cases also, and examples are not few in which typical neuromimetic phenomena came to an end, shortly after settlement of claim had secured for the patients complete repose of mind, and had freed them from the necessity of any longer allowing themselves to be their victims and exponents.

In speaking of the objections made to hypnotic experiments, Heidenhain seeks to show that the repetition of them does not appear to be fraught with danger or evil, but he mentions cases where attacks of convulsions constantly accompanied every hypnotic experiment, and one patient who suffered after every experiment from a certain degree of nervous irritability which lasted twenty-four hours (op. cit., p. 102 et seq.). I have myself no doubt that the risk of permanent damage to the stability of the nervous system and tone must be very considerable in all persons who repeatedly submit themselves, whether voluntarily or involuntarily, to the hypnotic state, even though it is not accompanied by convulsions or is not followed by "nervous irritability." The hypnotic state is not a natural, it is a morbid state; to repeat it is to perpetuate it, and make it an abiding part of the organization of the individual. Not less does risk of permanent damage to the stability of the nervous system lie in long continuance of any functional mimetic disorders. The longer they exist the more prone are they to give rise to lasting nervous disturbance, and to the phenomena which may be the result; and even in cases where the neuromimeses pass away under returning cerebral control, the risk is by no means small that from some exciting cause the conditions may be very readily reproduced. The lesson to be learned from this is obvious, that the sooner any cause for the representation of the phenomena is removed the better, and that the patients should

as far as possible be freed from the hurtful sympathy of friends. There is little chance of improvement or cure as long as the patient need not make the necessary effort to get well, and as long as his friends, in ignorance of the real nature of his malady, foster by misdirected sympathy and kindness those very symptoms whose continuance is fraught with danger to the stability of his nervous system. The question of diagnosis is thus all-important, and once established it is doing him a grievous wrong if his sufferings and symptoms are to be made the occasion of litigation and prolonged dispute.

CHAPTER V.

THE FRIGHT NEUROSES—(*Continued*).

I SHALL now illustrate the foregoing remarks by the brief record of several cases, the symptoms of which will suggest various comments as we go on. I adopt this plan because the multiplicity and variety of the so-called functional disorders prevent any suitable classification of them, and because this is not a text-book of nervous diseases. Information is at hand, and must be sought elsewhere, as to the condition of the reflexes, for example, in the different diseases of the nervous system, organic and hysterical, and only passing reference will be made to these and other indications of nervous disorder.

CASE XVI*a*.—*Case of Functional Paraplegia—Rapid Recovery after Settlement of Claim.*—V. S., a widow, aged thirty-eight, the strong and healthy mother of seven children, was in a collision. There was no history of her having been much hurt at the time, but within a few hours she began to have a pain, or a sensation which she described as "opening and shutting," in the small of her back. The next morning she continued her journey of nearly 200 miles, and finding that in a few days the pain in her back was a good deal worse, she went to a hospital. She was an in-patient in the hospital for six weeks, during the first three of which she was in bed, suffering from pain and stiffness in the small of the back and from general weakness. For three weeks she was up and moving about the wards, and she then made a journey of 330 miles in order to take one of her children to school. This business over, she then travelled home to the place where the accident had originally happened. This was exactly two months after the accident, and as soon as she got home she at once took to her bed, suffering from great pain in the back, from much hyperæsthesia in the dorsal and lumbar regions,

and from general prostration. She remained almost entirely in bed until about fifteen weeks after the collision, when it was accidentally ("accidentally," because this is just what so frequently happens in hysterical affections. "It is necessary to bear in mind," Charcot says, "that hemianæsthesia is a symptom which requires to be sought for, as M. Lasègue very judiciously remarks. There are, in fact, many patients who are quite surprised when its existence is revealed to them."—Charcot, "Diseases of the Nervous System," New Syd. Soc., 1877, p. 250) discovered that she had lost all motion and sensation in the legs. She had complete control over both bowel and bladder, and there was neither wasting of the legs nor bed-sores. The paralysis of motion and sensation seemed absolute. The woman was at the same time exceedingly "hysterical," and complained fearfully of pain in the back and of innumerable queer sensations in different parts of the body. The opinion was given that this paraplegia was not dependent upon organic disease; that it was not feigned; and that, although there was every prospect of her recovery, it was quite impossible to say how long she might suffer from the paralysis, or how soon she might be well. She was attended throughout this illness by a trustworthy nurse, and there was never any suspicion that the woman was wilfully maintaining her condition. No material change took place in her condition up to six months after the accident, when her claim was settled. Within a fortnight she left the house where she had been staying, and in three months she was walking about without assistance in perfect health. Further account of her cannot be obtained. It is open, of course, to any one to remark that this was a case of malingering. I do not take this view, and I think it of greater interest to consider what were the circumstancse conducive to the paraplegia, and what were those which brought about her recovery. There can be no doubt that the woman received a sprain of her vertebral column, and that she had some "shock;" but of greater moment in the history of the case is the fact that the long and fatiguing journeys, which she took within a short time of the accident, must have been largely instrumental not only in preventing complete recovery from the early prostration, but even in increasing the general weakness from which she suffered. After the first journey she was compelled to go to a

hospital, and after the second and longer journey she was so much exhausted that she had at once to take to her bed.

In two other cases of paraplegia, occurring in young girls, there was very much the same sort of history. One of them was remarkable in this, that after the collision the girl lay in a dazed, semi-unconscious state for a couple of hours, having received no injury beyond a slight bruise on the middle of her back by the fall of a box from the carriage rack. Movement was painful, and she took to her bed, gradually losing thereafter the use of her legs. They became extremely cold, but there was no other alteration in nutrition, and the reflexes were quite normal. No improvement took place in this case until the patient had been taken from home, placed in a hospital, and there put under suitable treatment. It is probable that the feebleness of circulation and coldness of the extremities often noted in these cases, together with the pain induced in moving the legs, provide the "suggestion" to the sensorium which results in loss of motion and sensation. And let it be noted that the effect of the accident was to produce that condition of daze to which reference has been already made, and to which, in the etiology of such affections, considerable importance must be attached. The legs of the other girl were equally cold, and in addition to the paraplegia, she presented this characteristic symptom, flexion of and inability to extend the fingers when asked to do so, although in all automatic movements there was no impairment or defect.

The way in which cases of this kind frequently recover shows pretty conclusively that the morbid seat is in the brain. A sudden impression which compels the automatic use of the legs may in a moment arouse the torpid sensorium, or a process of re-education, beginning at the very beginning, as it were, may be needful to restore the lost movements of the limbs by reawakening the brain to a full sense of its responsibilities in the circle of the will. Cases like these may look like fraud, but I feel sure that Paget is right when he says that in many of them the "fault is rather in weakness of the will than in its perverse strength." The patient says, "as all such patients do, 'I cannot;' it looks like 'I will not,' but it is 'I cannot will'" ("Clinical Lectures and Essays," pp. 188, 189).

The cases of functional paraplegia which have been recorded

were very typical of their kind, but we shall do well to draw remaining examples from patients of the sterner and, usually, less hysterical sex.

CASE XVII.—*Case of Functional Motor Paraplegia—Extreme Emotional Disturbance—Ultimate Recovery.*—T. B., aged forty-one, a man of gouty family, naturally very excitable, and able, as he said, to hear a pin drop in the next room, was in a very severe collision in which the carriage he was in was smashed to pieces. He crawled out of the débris as best he could and went on his journey, but in about half an hour he began to have retching, pains in the abdomen, and shivering. He therefore returned home. There were slight bruises about the limbs, and one on the forehead; and the next day, when in bed, he complained of pain in the right side of the abdomen and the lower part of the back, but at neither of these places was there mark or tenderness. For the next few days he seemed very ill, had severe pain in the head, occasional retching, and at night he wandered. For three days his temperature was raised. He was in a highly nervous state, and spoke frequently of a dread of lock-jaw and paralysis. Three weeks after the accident he still complained of severe pain about the sacral region, but there was no tenderness. He complained also of "numbness" in his legs, a word used by him to express not impaired sensation, but a difficulty which he felt in moving them. There was no hyper- or anæsthesia, but his walking, in which he helped himself by holding on to the furniture, was done with apparent fear and effort. He could stand quite well with his eyes shut, and there was no spasm of the muscles of the legs. His temperature and pulse were normal, and the bodily functions were naturally performed. His general condition improved, he was able to eat and sleep better, and even to get out-of-doors in a chair. He still suffered, however, from extraordinary emotional disturbance, was very irascible, and frequently cried. He continued to dwell on the fear of paralysis, and steadily lost the power of moving his legs. He made for himself an ingenious contrivance whereby he was able to move about by the support of his arms, but his legs were hardly used at all in progression. Eight months after the accident he was quite unable to walk, and failed entirely to make any requested

movements of the legs or feet during examination. The attempt to move his legs produced great mental agitation. There was no paralysis of bowel or bladder, and sensation of the legs was but very slightly, if at all, impaired. There was no material wasting. The cremasteric reflex (this case was seen before the value of patellar and other reflexes was known, and the cremasteric alone was tested) was normal. There was no rigidity or spasm, and no sign of bed-sore.

Nine months after the accident he had an attack of aphonia, brought on suddenly by hearing of the death of a friend. The aphonia lasted for three weeks, and then disappeared as suddenly as it began, when startled by one of his children rushing into the room. He also suffered from frequent nausea and retching, the least excitement, such as the visit of a friend, almost certainly making him sick. It is indeed very difficult to express in words how extreme was the emotional disturbance in this patient. He had always been a man of highly nervous temperament, likely, so it was said, to suffer severely from the shock of a railway accident.

I satisfied myself that the paralysis was not dependent on organic lesion, and eleven months after the accident reported to the railway company that the "cause of the paralysis seems to lie rather in the directing power of the will than in lesion discoverable of the brain or spinal cord." I had, moreover, no doubt that the case was perfectly genuine, but felt that it was impossible to say how long he might be ill, and that litigation would be exceedingly detrimental to him. The man himself was advised to make every effort to use his legs, and to re-educate the movements of them by daily practice. Litigation was avoided, and the claim, naturally and rightly a large one, was amicably settled thirteen months after the accident. By the kindness of his medical attendant I had frequent reports of this man after his claim was settled. For long he did nothing, and remained in a nervous hysterical state, and it was not until four years after the accident, when he made a complete change in his living and occupation, that he began to get well. Seven years after the accident, in the course of the year 1882, this was his own story, and it speaks better of his condition, past and present, than any other words. He considers that he was ill for between four and five years. He used the appliances for walking for about two years, and then began

to use sticks. Two years and a half ago he took a public-house in the country, and began to lead an out-door, active life. When he first began this, he could not get up from his chair alone, having either to be helped up, or to pull himself up by getting hold of something in front of him. Suddenly one day he got up without knowing it, and his son said to him, "Why, father, look what you've done!" "Good God!" he replied, "I have got up myself." From that day forth he was able to get up without difficulty. He still has great fear about his spine, and only a few weeks ago, when a friend struck him in the back in joke, he was terribly alarmed, and for two days could hardly walk. He can walk nine miles without fatigue and ride all day, he has gained weight, and is altogether stronger and better than he was before, regarding his recovery as due to change of life and scene. In appearance he was at this time the picture of health, and as far as his legs were concerned there was not a sign or symptom of anything whatever amiss with them, reflexes and nutrition being perfectly normal. I saw him again in 1890 in perfect health. (See a remarkable case recorded by Dr. Webber, "Boston Medical and Surgical Journal," Vol. X., p. 44, 1872—"Recovery after four years' paralysis following railroad injury.")

CASE XVIII.—*Supposed Spinal Injury—Spasmodic Twitchings of One Arm, etc.*—S. B., aged thirty-three, was in a railway collision at night, when a large number of persons were more or less shaken and hurt. He himself was not injured, as far as he knew, at any one place, and no marks of external injury were at any time discoverable. He complained, however, of being shaken, and looked pale and ill. He took to his bed, and in a few days complained very much of his back, and was in a continued state of alarm about his "spine." Beyond appearing shaken and nervous about himself, he had no sign of structural injury to any one part of the body. He remained in this negative condition for some weeks, and then began to move about the house, and once or twice he went out of doors. About this time there came on a peculiar twitching in the left arm, which is thus recorded in the notes: "To-day on my arrival he was lying dressed on his bed. I asked him to go into the next room, and he got up without apparent difficulty and did so. He sat down in an easy-chair,

when his left arm and hand at once began to jerk with sharp clonic spasms or twitchings, not unlike the movements of chorea. The movement kept on when his arm was held, and he said he could not control or arrest it. It was noticeable, however, that it ceased entirely when he began to undress, partially ceased when he engaged in conversation, and altogether stopped when his attention was specially directed to some other part of his body. Coincident with this movement of the arm was a continuous jerking of the head. There was no wasting nor any sign of loss of power in the limbs." He complained greatly of his back, and evinced tenderness on touch at the mid-dorsal and upper sacral regions. The temperature was normal, and all the bodily functions were naturally performed. He continued in much the same condition for nearly a year, a severe injury to the "spine" being made the basis of a demand for large pecuniary compensation. There was, however, neither history nor sign of lesion in any central structure, and the whole condition was regarded as one of neurotic disturbance, which might be very much controlled if the patient would only choose to exert his will. This view of the nature of the case received strong support from his previous history. He had been in a railway collision twelve years before. He then received no bodily injury, but he was very nervous about himself, and four months afterward began to suffer from spasmodic wry-neck, which lasted for four months, and which recurred again for a short time after an interval of two years.

There was no reason in this case to attribute any want of *bona fides* to the man in the presentation of his symptoms, although the largeness of his claim and the sequel of his case would rather tend to throw doubt upon its perfect genuineness. When compensation was settled he very speedily lost all the spasms and returned to work, and it was even said by one who had taken a friendly interest in his case that he had recovered with indecent haste. But his recovery, in my judgment, was due rather to the fact that settlement of his claim enabled him to make the requisite effort to do some work, and that healthy occupation provided the means of diverting his attention from himself and his ailments, so that the spasms were unconsciously forgotten and forthwith disappeared. Five

years after the accident the report ran that he was in good health, although he had been shaky and nervous for some considerable time after his claim was settled.

Both these cases present examples of undoubted predisposition to neurotic disturbance. It is impossible to say why the disorders should have assumed the forms they did, but it is interesting to note that in both of them there was a genuine dread of spinal injury, and that in the second case the wry-neck after the former accident, and the chorea-like movements of the arm and head, after an interval of no less than twelve years, were disturbances of the same kind. The cases, moreover, show of how much importance it is to know something of the previous history of the patients, and their special liabilities to disease, in order to arrive at a correct diagnosis.

CASE XIX.—*Shock to Nervous System—Hysterical Seizures Beginning in Syncope.*—R. C., aged thirty-nine, an officer in the army, was in rather a severe collision at night. He was awake at the time, and was thrown backward and forward in the carriage. He had no knowledge of being hurt, and helped the stoker, who was much injured. He then finished his journey, the "excitement," as he supposed, "keeping him up." The next morning he felt very ill and vomited, and he soon began to suffer from pain across the loins, queer sensations all over the body, nausea, giddiness, and want of sleep. On the third day he took a long journey of several hundred miles to be with some friends; and on the twelfth day after the accident he suddenly fell and struck his nose against the corner of a table. He soon became conscious and screamed violently. To use his own words: "The fit came on about three in the afternoon; I fell down and screamed, and then began to cry and sob violently. During it I was unconscious, although I knew that people were around me, and that I must use all my efforts to restrain myself and to keep quiet. When all was over, I did not know what had happened." He called this fit an "hysterical attack," and the doctor who saw him immediately afterward, and who found him more or less unconscious, thought that this was its nature. Six weeks after the accident he complained of pain in the back, loss of memory, inability to apply himself, occasional giddiness, nausea, and want of sleep. He looked anxious and worn, and his doctor,

who had known him for some time, said that he was undoubtedly much changed in manner and appearance. He had lost flesh, but all the bodily functions were natural. He described the fit in the words which have been given, and said that he had had two or three since, though not so violent as the first. A few minutes after this I had the opportunity of seeing him in a fit. It had begun with screaming, and he was found lying on the sofa with his eyes closed, his face very pale, and a small pulse. He took no notice of my entry into the room, but occasionally sighed. Asked how he was, he opened his eyes and looked wildly about. He was then very sick. After vomiting he roused himself, asked how long I had been there, and said he was better. Before leaving him he was apparently asleep. Within the next two months he had three or four attacks of the same kind, though of gradually lessening severity. His claim was settled six months after the accident. Twelve months afterward he still suffered in a slight degree from the effects of the injury, but it did not prevent him from attending to his work. No later record than this can be obtained, that six years after the accident he was still on active duty. It has some bearing on the history that this patient wrote repeated, and what might almost be called "hysterical," letters about his condition and future prospects, and that he made an enormous claim, thrice the amount which he ultimately received, without resort to litigation.

Nothing is known of this patient's previous history, other than that he had always enjoyed good health; and it is worth asking, what was the origin of these hysterical seizures? It seems to me that in all probability they began with syncope, which was a direct result of weakened cardiac power from the nervous shock, and that they assumed the form they did from the very fact that the accident had produced a profound impression on the patient's mind. He was reduced to a condition in which he was ready to be alarmed, and when, after the fainting, he became partially conscious upon the floor, he screamed hysterically in very natural and increased fear. And each subsequent fit began in the same way, by a sensation of syncope—not perhaps amounting to actual fainting—which by the alarm it caused him at once determined the screaming and sobbing which were characteristic signs of each attack.

With returning strength and cardiac tone the seizures lessened in frequency and severity, until they came to an end. In other words, the sensations induced by syncope provided a suitable and adequate "suggestion" for the attacks from which this man suffered. Just as a blow on the shoulder may cause sensations which provide the suggestion for palsy of motion or sensation in the affected arm, so in disturbances which are apparently more purely psychical in character, there is need of some suggestion which shall determine the particular disorder manifested in any given case.

A like explanation seems to me to account for such a symptom as continued vomiting, the origin of which is otherwise obscure, and which may be erroneously regarded as due to some grave central or other disease.

Case XX.—*Nervous Shock—Continued Vomiting.*—A healthy woman, aged twenty-nine, the mother of one child, was in a very slight collision in shunting. She was thrown suddenly forward, and a box fell from the rack and inflicted a minute punctured wound on the left frontal eminence. Until she felt the blood trickling on her forehead she did not know she had been hurt. An hour and a half after the accident, when she arrived at home, she vomited, and from that time onward vomiting followed immediately upon each attempt to take food. Never at any time was there the smallest indication of injury about the stomach. Four days after the accident she had an attack of acute hysterical laughter and crying, and in the course of the next four weeks attacks of a like character were repeated several times. She complained of shooting pains in the neck and head, and of pain, hyperæsthesia, and tenderness over the dorsal region of the spine. Nevertheless there was no spinal rigidity, nor any difficulty in moving her limbs. When I saw her a month after the accident, no evidence of local injury was anywhere discoverable, but her pupils were sluggish and wide, the knee-jerks were decidedly exaggerated, and there was well-marked though not sustained ankle clonus, such as is frequently seen in similar cases of so-called functional neurosis. The vomiting was still going on, but without pain, and with a perfectly clean tongue. All this time she had been in bed, and had become extremely weak. There was no rise of temperature.

A new line of treatment was now begun, the object of it being to improve the nutrition, by often repeated small quantities of milk or other light food; and if possible, by the smallness of the amount taken at a time, to baulk the vomiting habit. The lapse of another month saw a considerable improvement in her nutrition, she was able to be up and out of doors, the pupils were smaller, the knee-jerks were within the normal range, and the ankle clonus had entirely disappeared. There was not, however, any great improvement in the vomiting, for an endeavor to take an ordinary meal immediately made her sick. The reason for this was not far to seek. The patient had now become an object of special sympathy in the village, and her only return for the bounty of her neighbors, both rich and poor, was to go on vomiting. One thing was now essentially called for in order to bring about her recovery, and that was isolation from her friends. Accordingly she left home, was placed in the charge of a nurse, and treatment suitable for her condition was forthwith begun. It would be untrue to say that she never vomited again, because in the course of the next three months she did vomit twice, and twice only, in the old purposeless way; but this may be said, that her convalescence began from this time, and that she ultimately, within nine months of the accident, was quite well.

This case is, to my mind, a very instructive one. Almost uninjured at the time of the accident, it is certain that there must have been an amount of shock sufficient to cause the vomiting within an hour and a half, and the psychical effect was indicated by an outbreak of acute hysteria on the fourth day. The reality of the nervous disturbance was shown, moreover, by the increase of the knee-jerks and by the ankle clonus; and a vicious circle was quickly established—malnutrition affecting the nervous centres alike of brain and cord, whose condition in turn made the act of vomiting more easy and more durable in the absence of some physical cause. There never was any question as to the nature of the case, and it seems to me that there can be as little doubt as to the origin of that one symptom which was its especial feature. The initial act of vomiting gave the suggestion for its continuance to a sensorium profoundly affected by the circumstances of the accident. And it is abundantly obvious how a recogni-

tion of this sequence of events was essential for the adoption of the line of treatment which speedily ended in cure. Had this patient stayed at home, and been treated on the supposition that she had some serious organic disease, the result would surely have been different. I have now had under occasional observation during the past eight years the case of a young man whose symptoms were not unlike those of this woman. He had been very severely shaken in a collision, and there was much shock, out of all proportion to the physical injuries sustained. Vomiting came on within twenty-four hours, and has continued ever since in varying degrees. Repeated examinations have failed to discover any organic cause for it either in the stomach itself, the peritoneum, or the nervous centres, disease in one or other of which would in all probability have shown itself in this length of time. By a process of exclusion, therefore, the diagnosis points in the direction of the last case, but neither his own medical attendant nor I have been able to persuade him to submit to treatment by isolation. His case is of value as an illustration of the fact that settlement of claim does not always work for a patient's recovery. (In Dr. Bristowe's "Diseases of the Nervous System," p. 40, is an interesting lecture on "The Functional Vomiting of Hysteria," in which he relates a case of vomiting which lasted between two and three years, and which dated from a voyage made across the Atlantic. The author doubts whether food ever reached the stomach, and whether there was not some functional affection of the œsophagus.)

We may pass on now to say something of hemianæsthesia, surely one of the most remarkable indications of cerebral disorder. The text-books of medicine and of nervous diseases contain such full accounts of this strange condition, of its many vagaries and its accompanying disorders of the special senses, that there is no call to describe it here, and I shall content myself with a few remarks upon particular cases, choosing those of men for consideration.

Case XXI.—*Hemianæsthesia and Hemiparesis, following Hypnotic State from Fright.*—A highly neurotic but otherwise healthy man, aged forty-seven, was bruised in several places, head, neck, and buttocks, by being thrown suddenly backward and forward in a railway collision of no great

severity. He instantly lost consciousness, and so remained for two hours. On arrival at home his doctor was sent for immediately, and found him suffering from left hemiplegia in addition to great emotional disturbance, crying and sobbing. No examination was then made as to sensation, but two days afterward he was found completely anæsthetic on the same side, and all the corresponding special senses, hearing, taste, sight, and smell, were likewise affected. There was also loss of muscular sense, impairment of the sense of color, and spasmodic deviation of the tongue. The knee-jerks were increased, and there was slight ankle clonus. When I saw him three months afterward the various symptoms were much diminished in degree, and there was no longer any deviation of the tongue. Though able to walk and even get down-stairs, his gait when under observation was singularly slow and labored because of inability to use the left leg, the movements of which were now made in one way and now in another, there being nothing specially characteristic about them. The whole muscular system was extremely flabby, but there was no wasting of one part more than another. The man's aspect was suggestive of great mental depression, but he acknowledged that he was somewhat better than he had been. He has gone on improving, but it is impossible yet to give a complete history. The case is nevertheless worthy of note as it stands because of the early onset of the symptoms, and from the fact of the man having immediately passed into that state of daze or unconsciousness which seems to be so important a factor in their development. There is no reason to think that his unconsciousness was the unconsciousness of true brain concussion, for there was no local blow sufficient to determine a state of coma of two hours' duration, and the condition was more probably that which is due to fright alone. Why in this particular case the so-called functional disturbance should have shown itself in hemiplegia and hemianæsthesia it is impossible to say, just as no reason can yet be given for hemianæsthesia being more common on the left side than on the right. The loss of sensation was in all probability as early a phenomenon as the loss of motor power, both ensuing upon the hypnotic state which was an immediate effect of the accident. In another case the hemianæsthesia was detected on the day after the accident.

CASE XXII.—*Hemianœsthesia, etc., etc.*—A man, aged forty-three, of neurotic temperament, was in a very trifling collision, which jolted him, however, from his seat and deposited him on the floor of the carriage. There he found himself, and was subsequently unable to give any better or more explicit account of what happened to him. There was no evidence, however, of his having been hurt bodily, and he went to his business next day. He soon broke down completely, and a doctor who was sent for found him in a semi-dazed condition, and proceeded immediately to examine the state of cutaneous sensation. It was absent on the whole right side, and was accompanied, as in the last case, by some loss of power in the right leg. There were also present in an extreme degree the usual affection of the special senses, loss of muscular sense, and spasm of the tongue. With it also were many neurasthenical symptoms, coldness of the limbs, especially of the right leg, occipital headache, loss of sexual desire, and widely-dilated pupils. Occasionally also he had hystero-epileptic seizures. For many months there was little or no improvement, and at the end of a year, during which he had led the life of an invalid, and made no attempt to work, the hemianæsthesia still continued. His claim was finally settled, but whether that put an end to the anæsthesia or not I am unable to say. I think, however, it is highly probable, for it put an end to the "suggestion" of it in frequent medical examinations; and this is certain, that the man very soon resumed his ordinary mode of life, and within nine months gave every indication that his bodily health had been restored.

I do not for one moment wish to convey the impression that this case was not a perfectly genuine one. There was, of course, no doubt as to the existence of the hemianæsthesia and the accompanying phenomena, but from beginning to end of its long history it was an example of the injurious influence which the matter of compensation, and dawdling about at home, have in cases of the kind. Hemi- or any other distribution of anæsthesia is a valuable indication of the nature of any given case. It is an expression of an abnormal cerebral condition, and, whatever may have been its origin and exciting cause, there cannot be anything much worse for a patient than to have the symptom, if not revived, at any rate kept

alive, by repeated examinations, which are made either from genuine interest in the case, or in preparation for an action at law. I have pointed out on an earlier page how movements which fail from failure of the will to make them may, nevertheless, be automatically performed. The conception of something of the same kind is much more difficult in the case of sensory than it is in the case of motor power, but one could hardly go as far as to say that it was impossible for common sensation to be within the range and influence of what is termed will. The receptivity of the sensorium for impressions which reach it from the periphery may likewise be both voluntary and automatic; and the history of some cases inclines me to think that a person may acquire the power of inducing anæsthesia, much in the same way as by practice he may induce the repetition of motor phenomena which are close imitations of real disease. At all events I do not think that hemianæsthesia, real in itself though it be, can be regarded as outside the category of those cases to which the following quotation from Dr. Wilks is more or less applicable: "I do not look on hysteria," he says, "as a fictitious disease or a sham; the condition with all the phenomena is real enough; at the same time the hysterical state is so often associated with some moral obliquity that it is very difficult to say how far a particular symptom is feigned or exaggerated" ("Diseases of the Nervous System," p. 55, 2d edition). He records a case of gross imposture, in the history of which a pilgrimage to Lourdes played a conspicuous part, hemianæsthesia being among the man's symptoms.

It would be wrong and most unjust to say or to suggest that moral obliquity is an attribute of all persons who present hysterical symptoms, yet, even where there is a condition such as hemianæsthesia, the possibility of a certain amount of conscious influence over the chief symptom must be borne in mind.

CASE XXIII.—*Hemianæsthesia, etc.—Doubts of Perfect Genuineness.*—A man, aged fifty-one, was in an altogether trivial accident, in which, if he was injured at all, he sustained a slight sprain of his posterior cervical muscles. He did not know he had been hurt until the night after the accident, when he woke with a start, and the next morning he felt shaky and nervous, and was unable to write a letter. He took to

his bed, and after he had been there for a week he was examined by a surgeon, who observed such inconsistencies in his statements and symptoms as to lead him to regard the case as not perfectly genuine. When I saw him myself a month afterward there was left hemianæsthesia, and some weakness in motor power also. There were spasms during examination of the shoulder and neck muscles of the left side, and certain movements, such as squeezing with the left hand and putting out the tongue, he professed himself unable to perform, although neither in his speech, nor in ordinary movements of the limb automatically performed, was there any sign of paralysis. The special senses were also affected in the usual way. After an interval of two months there was slight, but only slight, improvement. How long this state of things lasted it is impossible to say, because renewed requests that the man might be seen by surgeons for the railway company were refused on the ground that he was far too ill to allow of any examination. An exorbitant claim was presented, and the case went to trial. It was then conclusively proved that during most of the time when he was too ill to be examined, and was wholly unfit for anything except confinement to bed, he was deceiving his own doctor, and was leading a life of very considerable enjoyment—after dark. In fact he loved darkness rather than light. No good purpose can be served by giving in detail all the facts of this case—let them be recorded by his own advisers, legal and medical; but this may be said about it, that the accompanying exaggeration and imposture were such as to throw very grave suspicion on the perfect genuineness, not on the perfect reality, of the symptom hemianæsthesia. And in endeavoring to come to a right conclusion as to the value of this symptom in any given case there is an error, I feel sure, to be avoided in looking upon hemianæsthesia as a thing which stamps a case at once as genuine simply because we cannot say how it is induced. *Experto crede.*

The record of two cases will now be given where the hypnotic condition was even more marked than in any which have preceded. In both the patients there was a history of previous psychical disturbance, and there was insanity, moreover, in their families. Both, I believe, were predisposed to suffer from neurotic disorders should any adequate cause arise.

CASE XXIV.—*Hypnotic Catalepsy, etc.*—B. A. B., aged thirty-six, a strong and active man, was in a railway collision at night, in which a large number of persons were more or less injured, though the accident was not severe. He complained shortly afterward of having been shaken, and also that his back had received a wrench, owing, he thought, to his sitting sideways when the collision occurred. He had one or two slight bruises on one arm, and a sprain of one wrist. For the first few weeks after the accident there were no symptoms of constitutional disturbance or of serious injury, but the man said that he could not hold himself upright or walk any distance in consequence of the injury to his back, and the doctors who saw him thought that he was to some extent exaggerating the effects of his injuries. About five weeks after the accident he suddenly changed. He constantly repeated that he was going mad, and that he was sure he was going to be paralyzed. He began at the same time to take violent exercise, walking several miles a day at great speed. This was followed by great exhaustion, during which he was "wandering and hysterical," and there ensued attacks which were described by a medical man who saw him as "hysterical mania." These continued for several days. The state which followed next can only be described in the words recorded at the time. "He is lying in bed on his right side with his knees drawn up. There is not the slightest movement when he is spoken to, or when he is touched through the bed-clothes. There is a continuous quivering of the upper eyelids. Asked to put out his tongue, there is no response, though when the lips are pulled apart he seems to make some effort to open the jaws and protrude the tip. By raising the lids the pupils are seen to be equal in size, and they react normally to light. The aspect of his face is that of complete repose and disregard; but he is obviously not entirely unconscious. Pulse 56. His arms and hands remain in any position in which they are placed. The arms and legs are very much wasted, and the whole body seems emaciated. The legs are at once drawn up spasmodically on tickling the soles, and pinching the calves evidently causes pain, for he groans and much contorts his face. On touching any part of the chest or abdomen rather firmly with the fingers, the whole body, face, and arms are spasmodically worked, the legs being frequently abducted and

adducted. The abdominal muscles are almost as hard as a board." He is said to have occasionally an "hysterical fit," consisting of spasms all over the body, beginning with an expression of fright, and lasting about fifteen minutes. An experienced nurse attending him says they are not like epileptic fits. He takes plenty of nourishment, milk and beef-tea, but little or no alcohol. He passes water only once within twenty-four hours, sometimes groaning beforehand as if in sign to the nurse. The bowels are never moved without enema. He lies for hours absolutely motionless, and three weeks ago he never moved a finger for a whole day, nor passed water once. A serious feature in the case is the great wasting, food, although taken in abundance, seeming to have small influence in maintaining the bodily nutrition, and he looks as if he might sink and die. This condition lasted for about six weeks, and then under the influence apparently of larger doses of alcohol—the increasing exhaustion and wasting having seemed imperatively to call for it—he began to emerge from the state in which he was, to move in bed, to open his eyes, to take more solid food, and even to speak a little very feebly. He was soon able to get up and go about, made flesh again rapidly, and took some exercise. He was, however, very nervous and apprehensive, and felt sure he should never get well. Seven months after the accident he still complained of his back, and held himself in a stooping posture. Questions were answered very slowly, and any required act, such as that of putting out the tongue, seemed to demand an unnatural effort. From this time he continued to improve, and in eight months he was so far well that it was thought right and prudent to allow him to arrange his compensation.

It bears upon the case that the claim was by no means large, and there was no reason at any time to believe that the matter of compensation was unduly affecting the patient's mind. Of far greater importance is the fact that there was a strong family history of insanity. His father and one uncle were "queer," a brother had actually been in an asylum, and his sister is very hysterical. His own account of the condition in which he lay so long is, "that he knew all that was going on around him, that he remembered when the doctors came, and knew always when there were more of them than usual,

but that he could not speak, and supposed that his brain would not direct him to do so." The sequel of the case is satisfactory, the following report of him being obtained two years after his claim was settled, or thirty-three months after the accident: "His recovery was gradual, but without any relapses. He married six months after his claim was settled, and has one son about two months old. He has had no illnesses, is at present strong and stout, and is emigrating some time this month."

It is impossible to conceive that the symptoms in a case like this could have been in any way dependent upon injury to the spine, and this much may be said of it, that, when this strange condition supervened, all thought of injury to the spine as a cause thereof passed from the minds of those who were attending him. The man, indeed, himself had shown, by the violent bodily exercise which ushered in the mental disturbance, that there really was no sign of paralysis or even weakness in the legs, and that the pain in the back was very slight indeed. The condition was essentially one of profound mental disturbance originated by shock, immediate fright, and the fear of impending evil, in a man with a strong family taint of insanity. The higher cerebral faculties seemed for the time to be in that state of slumber which has been mentioned, and his general condition was very like that described by Heidenhain and others as occurring in the so-called mesmeric or hypnotic state, and associated with cataleptic phenomena. (Writing of the disturbances of the motor apparatus which have been observed during hypnosis, he says: "More or less extensive cataleptic rigor becomes established; the limbs thus affected remain in any imaginable position they are placed in. The will has, it is true, not wholly lost influence over them, but it is exerted with very great difficulty. If, however, with a great effort, the parts be set in activity, there often results, instead of simple, convulsive movements which spread to other parts of the body."—Op. cit., p. 77.)

Case XXV.—*Hypnotic Catalepsy—Delusions.*—Almost exactly parallel with the last case is that of a strong and healthy man, aged thirty, who was in a collision, and who presented the usual signs of having received a sprain of his back and some general shock to his nervous system. He lay

for long in much the same hypnotic state as the last patient, alternating with fits of violence and passion. When he awoke from this, he became the subject of a delusion that he was being poisoned, and was accordingly removed to an asylum, about ten months after the accident. He remained there six weeks; and while an inmate he adopted a peculiar gait, which lasted up to the time when his claim was settled, two years after the accident, and which formed the ground of a very serious view that he had received a permanent damage to his spinal cord. His mode of walking was thus described when he came out of the asylum: "He puts the weight of his body on two sticks placed in advance of him, and draws each leg alternately forward with the foot much everted. When about to advance one leg he twists the other inward on the toes, so that the latter points forward instead of outward. He keeps the knees quite stiff. In this way he shuffles along with great rapidity. As he stood with his back against the wall, he was asked to lift up his knee, but he professed utter inability to do so." Very careful examination was made at this time as to the nutrition and state of the legs, and a report shortly afterward ran thus: "The reflex irritability and faradic excitability of the muscles of the lower extremities are normal; there is an entire absence of affection of the bladder or rectum, or of any trophic change, such as muscular atrophy and bed-sores. There is also an entire absence of muscular tension, rigidity, contraction, or deformity in the lower limbs. Examination did not enable me to determine whether any affection existed on the sensory side, as the patient absolutely refused to answer any questions. On the whole, my opinion of the case is that it is an example of many recorded instances, in which a slight and unimportant injury develops various emotional and hysterical symptoms." At a final visit made to him before his claim was settled, he complained more than ever of pain in his back, and called out loudly when touched upon his clothes. While sitting in his chair he could move his legs in any direction required of him, though much persuasion was necessary to get him to move them at all. He suddenly vomited without any precedent sign of nausea or retching. Asked to walk across the room, he essayed to do so after much persuasion, and walked in the manner already described. There was no tremor of the legs during progression, and

nothing like ankle-clonus or the gait which is seen when there is secondary degeneration of the cord. Subsequently, on being asked to go into the next room, he began to do so, but almost immediately fell down flat on the floor, whence he was lifted and carried away. A very large claim for compensation was preferred, and was arranged two years after the accident, not, however, without a resort to litigation. He shortly afterward left the house in which he had been living, and for some time it was not known where he was. Forty-two months, however, after the accident, he was fortunately seen by one of the medical men who had visited him during his long illness, and he found him in perfect bodily health and vigor, and the father of another child. It should be stated, as having an important bearing on the case, that the man's previous history was bad. He was always very irascible, and some years previous to the accident he had been laid up with sunstroke. There was also some doubtful history of insanity in his family.

It will not be thought that this case has been mentioned unnecessarily, when it is pointed out that pain in the back was throughout a prominent symptom, and that it was considered by some to be a case of severe injury to the spine. From the first moment, indeed, treatment was specially directed to his vertebral column, and a most careless examination of the urine, which was found to be feebly alkaline after it had been standing for some time, seemed to lend support to the diagnosis that there had been injury to the spinal cord.

It need cause no surprise that there were wide differences of opinion as to the nature of this case. "Shamming," on the one hand, to sclerosis of the lateral columns, preceded and originated by a meningitis, on the other, formed the two extremes. The truth lay between them, and that opinion proved correct which held that it was essentially a case of functional disturbance, and that as there was no special reason or symptom to place any lesion in the spinal cord, the man would in all probability get perfectly well. The previous history of the patient showed that he was liable to serious psychical disturbance, but it is only right to add that the motive in this case for maintaining the neurotic state was exceedingly strong. Control might have been exercised, I believe, by this man far

more easily than by the previous patient, and the representation of many of his symptoms was not very far from being wilful. Since this case was originally described, the man has been in another accident, and in support of his claim for compensation he again adopted the peculiar gait which has been described. He carelessly forgot, however, to keep it up on all occasions, and the early settlement of his claim was a direct consequence. As to this particular symptom in the case no more need therefore be said. Some parts of a case may be genuine but not all, nor does a real psychical disturbance enable a man the better to resist the temptation to invent or exaggerate symptoms in view of a pecuniary claim.

Glancing finally over the cases mentioned in this chapter, the number of which might have been multiplied almost indefinitely, it has to be noted that the physical severity of the accident or the bodily injury has obviously but little to do with the symptoms which supervene. Nothing is more certain than this, in searching for a cause of the symptoms, that it is not in bodily injury that the cause is to be found. One man may be hurt in one way, another in another, many are not hurt at all, but the symptoms have all a common cause, best and most comprehensively expressed in the one word—fright. And varied though the symptoms may be, they are the manifestations of a fright neurosis. This also is the burden of the teaching of Oppenheim in the work to which reference has been already made. In his experience, however, and in his view psychical disturbance and change, amounting almost to insanity, have a more prominent place in the history of his cases than has been my own experience, or is to be met with in the description of cases in the English tongue. Thus, in one place we find him speaking of anxiety growing into a real pathological entity, and of the great majority of the cases falling into a distinct category of traumatic neuropsychoses. He is satisfied neither with "traumatic hysteria," nor with "traumatic neurasthenia," as suitable terms to describe the cases which he has himself had under observation. I do not, however, think that "neuropsychosis" is a term altogether applicable to the majority of the cases seen in this country, and I am inclined to believe that there are three main types of functional nervous disorder following injury—the hysterical, seen in France; the psychical, and more mark-

edly hypochondriacal, seen in Germany; and the neurasthenical, seen here. So much, however, depends on the way in which cases of this kind are looked at, that it would be no surprise to me were Oppenheim to see in a hundred English cases typical examples of his own neuropsychoses; Charcot in a hundred German a vast amount of hysteria; and an English observer both in French and German cases many symptoms indicative of neurasthenia. All are, I believe, describing the same thing, and neurasthenia, it must be remembered, is itself a functional nervous disorder through and by which many symptoms arise.

At any rate, if the cases described by Oppenheim are examples of the cases most frequently met with in Germany, the type in that country differs, it seems to me, from the type in this. Not that cases of psychical disorder are not met with here, but that they are far less common than in that country. In some of the cases in my own experience the symptoms have been originated by something more than fright, and there has been a clear history of concussion of the brain, while in others the evidences of nerve prostration or general neurasthenia have been especially prominent. Thorburn relates the case of a woman with left hemianæsthesia (op. cit., p. 196) following severe shock and bruises in the Hexthorpe collision, of whom he writes: "Her mental condition was remarkable. She had an intensely frightened 'scared' look, like that of a wild animal. She paid little or no attention to her surroundings, and it was with the greatest difficulty that she could be got to answer even simple questions. She was quite incapable of connected speech, but there were none of the emotional manifestations usually regarded as hysterical." A year later this condition had passed away, although there was still some impairment of sensation. Commenting on the case, he says that beyond the hysterical hemianæsthesia, there was for a time a profound mental change also of hysterical origin.

The same writer describes a case of hysterical melancholia with occasional suicidal impulses. The man, however, had never attempted to follow them out, and when his claim was settled he improved. In a case quite recently under my own observation, in which there were symptoms of extreme neurasthenia, the patient, a man aged thirty-three, suffered for some weeks from the greatest mental depression, had visions of horrible faces before him at night, and suicidal impulses

which led him—himself—to take care that he was never left alone. Thus protected, he never made any attempt on himself, and when his strength began to return, all thoughts of self-destruction passed away; but so overpowering was the sense and the remembrance of his mental depression that, weeks afterward, he said he wished that he had really committed suicide. This man had been in a very severe collision, and was bruised in many places, but it was not until three hours after the accident, when he was far from the scene of it, that he became unconscious. And on this there ensued the symptoms of nerve prostration, together with slight hemianæsthesia of transient duration, and the mental symptoms which have been named. Six months after the accident, when he was beginning more rapidly and decidedly to improve, he still had an expression of the intensest anxiety, as if he had passed through something very terrible. I do not propose to dwell longer on this class of symptoms, because the type of case to which they belong is certainly not common in this country. The reader must therefore turn to Oppenheim's work for information on the subject.

These symptoms of mental disorder seem to me to emphasize in a special manner the fact that most of the results of railway injury are essentially psychical in origin. Belief in their reality is certainly not lessened by the fact that, in Oppenheim's experience, many of the sufferers were not in a position to claim compensation for the injuries they had sustained; and at the same time it will not be questioned that the symptoms of mental disturbance may be readily increased and kept alive by those very things which, in the case of other symptoms, are so prone to work prejudicially and to retard recovery. A very great deal depends also on the manner in which the various complaints are regarded and observed, and no one will deny that the creation and development of all sorts of symptoms may be readily induced, when patients are in this condition, by leading questions which suggest them to their minds.

CHAPTER VI.

ON TREATMENT.

I PROPOSE in this chapter to make a few collective remarks on the principles which should underlie the treatment or general management of the various cases which have been considered. It has been pointed out that compensation very frequently exerts an injurious influence on the clinical history of railway injuries, and it may at once be said that were there no question of compensation the treatment of them would be decidedly easier than it is. An endeavor, however, must be made as far as possible to keep this matter in the background, and to discuss the subject of treatment on the assumption that our patients are anxiously desirous to get well, and to have the best that can be done for them in order to promote recovery.

First of all, as to those spinal injuries, which we have seen, in the great majority of cases, to consist of sprains of muscular and ligamentous structures. The two conditions which have to be remedied are pain and stiffness, and care has of course to be taken that no harm shall ensue from the treatment adopted. Diagnosis is, therefore, all-important, and it is essential, by a very careful examination, to make sure that the injury is not of a more serious nature than usual, for the line of treatment which is necessary for the removal of stiffness would be that which above all others is objectionable in the case of osseous or meningeal injury.

Rest and warmth are, in the early stages, the two things most conducive to relief from spinal pain; rest by reclining in bed, warmth by the continuous application of hot fomentations or poultices. In every case, the question has to be considered, "How long ought a man to stay in bed?" and the answer to it must very much depend upon the severity of the injury, on the character of the pain, and the extent of the

spinal column which is involved. There are very few instances, however, in which the patient should be longer than three weeks in bed, and in many it is decidedly advantageous that he should be up much sooner. For the longer he is at rest upon his back—and the rest, be it remembered, is simply to allow time for the complete resolution of the subcutaneous injury sustained—the more likely is it that he will suffer from spinal stiffness afterward. This is what we are wont to see in the case of sprains in the neighborhood of the joints of the limbs, and there is nothing in the case of spinal sprains to exempt that part of the body from like consequences. The man must be up and move about; and gentle gymnastic exercise each day, such as he himself can make at home, will do much to prevent the increase of spinal rigidity, and to remove that which is already present. Here, however, comes in the difficulty, that the pain which is sure to follow the first movements made will be to his mind an unanswerable reason for not moving any more. Compensation is likely to support him in this resolve, and all attempts to get him to move about are likely to be frustrated. The stiffness increases, and is more incapacitating, and it becomes essential, perhaps, to adopt some more definite and vigorous treatment. Massage, it is well known, is of inestimable value in the treatment of sprains and other injuries in the neighborhood of joints, and recently the practice has been advocated of treating sprained joints, and even fractures in the neighborhood of joints, by immediate massage without a preliminary period of rest. The same treatment is to be recommended for the stiffness of a sprained spine, but it must be systematically carried out, care being taken throughout that no undue strain be put upon the system generally, should the bodily nutrition be below the natural standard of health. Especially has this to be remembered in those cases where the spinal pain, with its accompanying stiffness, is the result of weakness rather than of any injury sustained. The weary aching of myalgia, which is prone to arise in all cases of prostrating illness (and we have seen how common is general bodily and mental prostration after railway accident), is not to be remedied by the vigorous manipulations of the masseur, unless something be done at the same time to improve and build up again the general bodily nutrition. This method of treatment is usually more

satisfactory in its results than that of faradization of the muscles on either side of the spinal column, although both in this manner, and in the galvano-faradization recommended by De Watteville, there are powerful means for improving the muscular nutrition, calling muscular fibres into action, and so relieving the stiffness. What is wanted is to get some of the muscular fibres which have been disused into action, and if by any chance there has been adhesion of neighboring ligamentous fibres because of the sprain, movement is imperatively necessary to start the reparative process. Thus it is that ironing the back with an iron as hot as can be borne is frequently an admirable remedy in these cases. The warmth is good in itself, the friction stimulates and restores the local circulation both of capillaries and lymphatics, and the application of great heat to the skin makes the patient shrink and move, and so calls fibres into action over which he has no voluntary control. I am altogether opposed to the treatment of these spinal sprains by the application of spinal jackets; they merely postpone to another day the treatment which will have to be carried out, and they moreover tend to increase the rigidity, and make the ultimate treatment more wearisome and difficult. Cumbrous in themselves, they do little but harm. Nevertheless, it is certain that patients sometimes find relief when they begin to go about again from wearing a belt, for it gives support to, and provides warmth for, a part which has the sensation of weakness. Relief also may be given sometimes by wearing a plaster over the loins, belladonna or other; but as a matter of fact the best relief of all comes in time from daily exercise and leading the same life as before. A neurotic, gouty, or rheumatic history and inheritance are prone to make all these cases troublesome, and any special element of the kind should never be ignored in considering the question of treatment.

While, however, the vast majority of the cases with which one has to do are either cases of simple sprain or myalgia from a lowered condition of the general health, the comparatively few cases in which there is more serious injury outweigh all the rest in importance. If we are convinced, by the abiding character of the pain or by the involvement of a nerve trunk, that there is inflammation, perhaps with synovitis, of a small spinal joint, or some local meningeal thickening, then

it is very obvious that a wholly different line of treatment must be adopted. Rest, local rest, must be rigidly enforced, and such help in the absorption of inflammatory products as is likely to be given by local counter-irritation must not be neglected. Further, if there be any suspicion of syphilis, influence must be brought to bear on that element in the case by those special remedies with which all are familiar. Above all things, it is important that the patient be kept under careful observation.

Passing now to the symptoms which frequently accompany spinal sprain, but which are nevertheless independent of it and are often found alone—those symptoms which are collectively indicative of neurasthenia—the essential line of treatment to be adopted is to keep up the bodily nutrition. A word, however, may first of all be said about the medicinal treatment of these cases, emphasizing at once and decisively that there is no specific remedy. We all know how much of fashion there is in medicine, and in the days when bromide of potassium was administered for almost every form of nervous disease it was the custom to fly to bromide, under the impression that a sedative was essential to quiet the nerves. In the early stages of severe mental shock, with its sleeplessness, general nervousness, and agitation, it is certain that bromide of potassium occasionally brings considerable relief; but although every one can take a casual dose of bromide without harm, the continued taking of it is likely to be most injurious. And in my former work, as well as in a special clinical lecture on the subject ("The Abuse of Bromide of Potassium," "Medical Times and Gazette," Vol. I., April 4th, 1885), I ventured to point out how much, and how often, harm had been done in the management of these cases by the administration of bromide of potassium in frequent doses over long periods of time. And it is absolutely true that the convalescence of many patients has only begun when the bromide so administered has been withheld. The symptoms of bromism, be it remembered, are essentially those of general depression both mental and bodily, irritability of temper, a continued feeling of exhaustion and incapacity for any work, intellectual dulness and loss of memory, a sense of utter feebleness, a tendency to be despondent and to cry, and loss or impairment of sexual desire. These, it will be recognized, are very much

the symptoms of general nervous exhaustion after railway collisions; and it is certain that the continued administration of bromide of potassium is likely to do them harm, and seriously prevent their removal. As Dr. Anstie pointed out many years ago, it is only those who are in vigorous bodily health who can bear its prolonged administration. It is the potassium which is the injurious element in the salt, and if it be merely desired to produce sleep and quiet let the bromide of sodium or ammonium be given in preference.

One of the greatest and most frequent difficulties in these cases is to procure sleep, and the whole round of the Pharmacopœia may be almost gone through without success. Of opium compounds the bimeconate of morphia is often the least injurious, and sulphonal and chloral, with or without bromide, are sometimes useful. I have no faith, however, in any one remedy, nor is any one infallible. The patient is often much better without them, and if he sleeps much or little during the day there need be less concern as to his not sleeping at night, provided that at night he is not left alone to work himself into a state of nervousness, agitation, and fear. Alcohol is of little or no use in these circumstances, and it may be said, once for all, that patients with the symptoms of general nerve prostration can rarely bear it. In the majority of cases, however, it is not the want of sleep which is so harmful, but the want of food.

It has already been pointed out how often disturbances of digestion accompany the symptoms of general nervous exhaustion; they do something more than accompany, they are in themselves important signs of the condition; and it is simply an inevitable part of the condition that the patient cannot take ordinary food in the ordinary way. In a word, the notion that he can subsist on his usual three meals should as soon as possible be abandoned, for otherwise it is practically certain that he will obtain an insufficiency of food. The consequence is this, that the already exhausted nervous system is prone to become more exhausted still from the want of proper nutrition. The rapid wasting that is sometimes seen in these cases is often quite as much due to the want of food, as to any direct effect upon the nervous centres themselves. Easily-assimilable food must therefore be given in small quantities at frequent intervals, and neither at night nor by day should the

... without ... Just as convalescence has fre- ... when ... of potassium has been withheld, ... that convalescence is frequently seen to begin ... when special attention is directed to this mat- ... adequate nutrition and food. And what fol- ... An improved sense of bodily well-being ... of the myalgia from easily-induced muscular ... above all things, very often the return of sound ... sleep. Food is the thing to break through ... which encompasses the patient.

... that other class of cases in which the assimi- ... of food is difficult, and where there is perhaps a ... hysterical element acting predominantly in the ... The symptoms alone defy treatment. The patient, ... has to be treated as a whole. ... objectionable, and the surroundings of his ... all luxurious. Here the best home is ... the treatment ... per- ... the West ... treatment in its ... —so likely ... that ... attitude ... together ... psychological ... It is ... to in- ... causes which are ... of how ... this is ... sign of ... consta- ... thing which is so ... nervous

... cases of ner-

him from going to his work the day after the accident. He feels only a little shaken, but nevertheless it is eminently advisable that such a man should for a time rest quietly at home. I am sure that in very many cases the severity and continuance of the symptoms have been due to want of rest at first. The precaution of complete rest may wisely be adopted in all cases of railway injury, be the early symptoms never so slight; and at a later stage it is equally certain that no perfect rest can be enjoyed, when a man is worrying about compensation; just as the enjoyment and rest of a holiday are assuredly destroyed, when a man has his letters sent after him to plague and annoy him.

CHAPTER VII.

MALINGERING.

"Is the condition before us real or feigned?" is a question which we have sometimes to ask ourselves in the routine of practice. A correct answer to it is obviously of great moment to both doctor and patient; and I propose, therefore, to say something on the special kind of malingering which may be met with after the injuries, or after no injuries, received in railway accidents. It may be well, however, in the first place, to name some of the points which have to be borne in mind in the endeavor to come to a right conclusion, that we may decide whether the signs of disease before us be real or assumed, or the complaints we hear be genuine or the outcome of wilful exaggeration; whether, indeed, to adopt the classification of Ogston, the disease be feigned, factitious, exaggerated, or aggravated. It is a common experience that most feigned disorders have in them some basis of reality, or some revival of the symptoms of a former lesion or injury used again for purposes of deception. Familiarity with the phenomena and history of disease can alone, therefore, enable a man to pronounce with certainty as to the real nature of any particular disorder, and to detect the mistakes into which malingerers so often fall.

An apt illustration may be taken from the attitude and position of joints in real and assumed disease. By his loud complaints a man may wish to suggest the presence of destructive mischief in a joint, but in all probability he will go wrong in the attitude and position which he gives to his limb. Or without pretending to be afflicted with actual joint disease, a patient will sometimes affirm that a joint has become stiff, and that it is impossible to move his arm or leg. It is unnecessary to make any mention here of the recognized causes of stiffness and anchylosis of joints; suffice it that the entire absence of them, both in the history of the case and in the

course of the disease, will reveal a flaw in the evidence sufficient to raise suspicion. Suspicion grows into tolerable certainty if you are careful to observe the conduct of the person under examination.

A man complained that he could not work because of stiffness in the right elbow and inability to straighten his arm. He said he had fallen on his elbow a month before, but it was clear from his answers to questions that the injury had not been at all severe. Comparison of the two elbow-joints showed an entire absence of physical signs, and there was no wasting of the limb. Noticing, in examination, that attempts to flex or extend his arm were forcibly resisted, he was told to look in the opposite direction, questions were asked him unconnected with his arm, and there was no difficulty in bringing it at once to natural and full extension. A turn of his head and eyes toward the affected limb was immediately followed by active flexion to the original degree. Complete flexion also could be produced under like circumstances. Examination of both arms simultaneously seemed to confuse him, for he called out with pain when pressure was made on the sound limb. Such inconsistencies as were met with here ought, at any rate, to place us on our guard. A man based a large demand for compenstion from a railway company on stiffness of his elbow and inability to move his arm, the result of a collision. A verdict incommensurate with his expectations having been recorded, he threw up his arms and exclaimed, "My God! I'm a ruined man."

Furthermore, an impostor may adopt devices to produce conditions, which, in themselves alarming, are yet seen to be without significance when every feature of the case is examined. A prisoner took to his bed complaining of great pain and swelling of the abdomen. Although the belly was enormously distended and tympanitic, there was no other sign of illness about him, and there was an entire absence of any one condition on which tympanites usually depends. After a few days' observation, and having carefully weighed all the facts of the case, the surgeon came to the conclusion that the man purposely induced the distention by swallowing air. Loudly enough for the prisoner to hear him, he accordingly remarked to the warder, "When I come to-morrow I shall bring an instrument to tap him." On the morrow the tympanites had

disappeared. (The same method of imposture is recorded by Gavin [" Feigned and Factitious Diseases," p. 299], who writes: " This affection, tympanites, has been so successfully feigned as to deceive a board of French medical officers; but this individual possessed the extraordinary power of greatly distending his abdomen by swallowing air. He, however, obtained an unqualified exemption from military service by presenting himself in this state, with clothes made for the occasion.")

More common are the cases where patients assure you that they are losing blood in large quantities from the bowel. The causes of hemorrhage from the bowel are well known, although an exact diagnosis may be sometimes difficult because of their very number and variety. The malingerer, however, does not know that profuse hemorrhage—and it is of profuse hemorrhage of which he invariably complains—gives rise to well-defined symptoms due to loss of blood. Who ever saw a patient losing blood, either in alarming quantities or in small amounts spread over a long time, with a florid lip, a tranquil pulse, a cool skin? Should not the presence of every indication of health warn us that we have to deal with something altogether unusual? Should we be doing rightly if we paid little or no attention to the general condition of the patient, and endeavored to estimate his case by simply hearing the story he told us, without examining the blood which he showed? By neglect of such simple precautions an erroneous diagnosis was made of a case where pints of blood, not the man's own, were presented as having been passed per rectum; and the same thing happened in another case where a man showed, from the same supposed source, prodigious quantities of " blood and corruption." Both were cases of imposition—subsequently known and proved—after railway accidents; and yet in both of them the fraud was successful. Surely when conditions such as these occur alone, when there is neither discoverable cause, nor the usual, inevitable result, one ought to be able to say of them at once, " Impossible, untrue!"

In the same category it is not amiss to refer to dilatation of pupil induced by the use of atropine, a point of some importance, because it has been shown in a previous chapter that a wide sluggish pupil is a valuable sign of loss of nerve tone. " The access to atropine or belladonna," writes Mr. Hutchinson, " on the part of the public is now so easy that we cannot

be surprised that we encounter mydriasis as the result of an accidental and perhaps unknown use of this agent, or of its use with intention to deceive. It is the first question which will occur to a surgeon on seeing a dilated pupil, 'Has atropine been used?' and he must be on his guard in cases of hasty denial. . . . Not infrequently the ophthalmic surgeon has to encounter cases of intentional deception. These occur usually in young women of emotional tendencies. . . . A highly-cultivated young lady consulted me for 'pemphigus.' She had blebs all over the left half of her body. But these blebs were, some of them, not round but oblong, in a style which no skin disease ever assumes, and very obviously the result of the application of a brush. She was liable also, I was told, to attacks of dilatation of the pupils and loss of ability to read. These attacks usually lasted a week. This case is only an example of what has frequently come under my notice. Although it is possible to use atropine in such a weak solution that the ciliary muscle is not affected, yet in most of these cases a more complete effect is obtained, and the loss of power to read is produced in addition to mydriasis. If the latter be present alone, and if it persist for long, the suspicion of deception may be put aside." ("On the Symptom-significance of Different States of the Pupil," "Brain," Vol. I., p. 462.) In all cases where the use of atropine is suspected, it is essential to examine the patient frequently, and carefully look for some concomitant and confirmatory symptom of nerve disturbance. The pupils, moreover, it need hardly be said, must be examined both in light and shade; and it should be borne in mind that, where there is inequality of the two pupils, the dilated pupil need not necessarily be the one affected. The pupil which is the smaller of the two may, for example, be unable to dilate, and be the one really at fault, because of sympathetic paralysis—a condition of things by no means unknown after organic injury to the lower cervical spine. The question might here arise whether eserine had been used, but I am not aware that eserine can induce the other signs of sympathetic paralysis—shrinkage of the globe, and contraction of the palpebral fissure.

Let it not, moreover, be forgotten that any kind of old injury, deformity, or want of perfect symmetry may provide the malingerer with the opportunity for the practice of im-

posture. Hydroceles, varioceles, and herniæ; fatty tumors, sloughing gummata, and sebaceous cysts; distended bursæ, and anchylosed joints from long-past disease, are some of the conditions, which, in my own experience, have been attempted to be palmed off as the result of railway shock. No man who knows his business can be taken in by such things as these. Great care, however, must be always exercised in the examination and estimation of abnormal conditions which may be presented, that no injustice may be done a man in coming to a hasty conclusion that he is malingering.

It is singular, for example, how ignorant some persons seem to be of the existence of deformities, or states of body, which must have been endured for a long time.

CASE XXVI.—*Case of Old Lateral Curvature of the Spine—Condition Unknown to the Patient.*—A man, seventy years of age, came to St. Mary's Hospital, complaining of pain over the right side of the thorax. When he had been stripped, it was found that he had lateral curvature of the spine to an extreme degree. He said that this condition was of quite recent date, and that he had only noticed it since he felt the pain. Judged by itself alone his story was enough to cause alarm; but, both from the ossification of his costal cartilages, and from the fact that there had been no alteration in his stature, it was clear that the spinal curvature was of old standing, in all probability nearly as old as the man himself. Had it been an acute change at this time of life, and had the pain which brought him to the hospital been due to the curvature, or been a symptom of some serious malady which lay behind it, a simple liniment and a tonic would hardly have restored him in a short time to his usual state of health.

So also the absence of perfect symmetry between the two halves of the body, some trifling difference in the facial lines, or slight excess in size of one limb over the other, and of one half of the spinal muscles over the other half, may be regarded, when taken by themselves, as evidence of very grave disease.

CASE XXVII.—*Paralysis from Pressure on Musculo-spiral Nerve—Accompanying Facial Asymmetry.*—A laborer, aged forty-two, came to the hospital on June 12th, saying

that on waking from his usual nap after dinner the previous afternoon, he found his right arm and hand "numb," his fingers and thumb flexed, and his wrist dropped. This paralysis of the extensor muscles was partial only, and was accompanied by some tenderness above the elbow on the inner side of the arm, and by a small anæsthetic area over the ball of the thumb. As usual, recovery was slow, and, although he was then able to work, he had not regained full use of his wrist and hand when he was seen six weeks afterward. Interesting though this part of the case may be, the special point about it was the fact that the left side of the man's face was almost entirely wanting in facial lines, while their presence on the right side gave him the appearance of having left facial paralysis. To the palsy of the arm there thus appeared to be added paralysis of one side of the face, and the combination might have suggested grave disease, had not a careful inquiry into every circumstance of the case led to the diagnosis that this asymmetry was peculiar to the individual. And this opinion was subsequently confirmed by the patient himself. Yet how easily, under the besetting temptations of railway injury, might a hastily-expressed conclusion as to the pathological origin of such a state have given an unscrupulous patient the opportunities of using his natural peculiarity for purposes of deception and fraud. We meet with such conditions every day, and it is of supreme importance to recognize and rightly estimate them, not only that we may allay the anxiety of the patient who honestly believes his old complaint is new, but also that we may nip the means of deception in their very bud, and not ourselves unwittingly befriend the imposture.

I shall not attempt to enter in any detail into the feignings of paralysis and kindred nerve diseases. The same principles must guide us, and we shall find them very seldom fail. The artifice may be clever and well devised; it may be long sustained and free from variation; but it is very difficult, and therefore rare, for the malingerer to simulate a real disease with accuracy. He exaggerates; that which he could not do he does; he will not do that which he could do if his state were real; and you find that his symptoms are such as you have never seen or known resulting from any affection of the

brain, the spinal cord, or the nervous system generally. Subjective symptoms largely predominate, and you observe that such objective symptoms as he has are mostly those over which he can exercise his will. He cannot make his eyelid droop; his tongue does not always deviate, nor is the angle of his mouth always drawn; he knows not how to paralyze his bladder; there are no bed-sores; he does not waste; his palsied limb resists examination; his fits occur at convenient moments when he cannot harm himself, or when he can be under the observation of those who do not know their import or their signs; in his coma he is not unconscious; and added to all he has the aspect of health, nor is any vital function deranged. ("In peripheral paralysis of the facial the expression of the face is very striking, for, owing to the loss of muscular tension on one side, it falls, while the opposite side is drawn up. This distortion is much increased in smiling or talking, or whenever the influence of the will is exerted on the muscles" [Wilks, op. cit., p. 439]. But in laughing or talking the impostor moves, he cannot help moving, the paralyzed side, and the asymmetry becomes less instead of more obvious. I have a case in mind.)

The so-called functional, hysterical, and neuromimetic disorders have many symptoms which often look like imposture, but I believe that the sufferers who present them are prone to deceive themselves more than other people. That the manifestations of hysteria are not necessarily feigned, or due to expectant attention, is indeed shown by the fact that they may be found even in young children, who have what may be called the requisite hysterical neurosis. Some remarkable cases of "hysterical analgesia in children" recorded by Dr. Barlow ("British Medical Journal," Vol. II., p. 892, 1881) show conclusively that a symptom of hysteria, which in the adult may lead to the suspicion of imposture, may be seen in children so young that the very idea of feigning is out of the question. As I have already pointed out, the one common characteristic of all these cases lies in a strange perversion and abeyance of volitional power or will, whereby each action, word, and thought seem to run riot, as it were, for want of due control. Largely unreal and independent of structural change, the symptoms admit of easy exaggeration and representation whenever the uncontrolled whim of the moment al-

lows; but having grown, step by step, out of slighter conditions which there was neither the wish nor the determination to subdue, they seem in their very nature to exclude deliberate imposture. Practically, too, the kind of treatment these disorders require is very different from that which suffices to cure ailments altogether feigned. Be the condition, however, what it may, to the patients themselves it is very real: the pain, the stiffness, the palsy, are as great to them as they are described, or as full of evil consequences as it is imagined and believed. The symptoms may be of little moment in themselves, but it is wrong to look upon them as altogether feigned.

The cases already given in illustration of some of the points and principles, which it behooves us to bear in mind, have been designedly drawn from ordinary hospital work; and they are of value in showing that no special practice is required to teach important lessons bearing upon the subject, and that these can be learned from cases which are met with every day.

As I have already said in speaking of the after-history of nervous shock, so now in turning to the more special topic of malingering after railway accidents, it must be acknowledged that ordinary hospital patients provide little opportunity for gaining familiarity with the kind of malingering with which we have now to deal. This, however, has to be noted, that, whatever may be said of every other form of malingering, there is no obscurity or doubt in the case of railway injuries as to the motive which may induce a man to exaggerate or to assume symptoms of disease. It may be summed up in the one word "compensation," to which the law of the land entitles him, whether for damage to his person or loss in his business consequent on the negligence of the public company which had engaged to carry him. Has his injury been great; has he lost a limb, or been otherwise maimed; or has his life been then, or in the future, imperilled; it is almost needless to remark that, while no money can adequately compensate him, the amount to be paid him must of necessity be large. When, however, the injury is trivial and passing, when there is neither structural damage nor prospect of lasting enfeeblement of body or mind, it is evident that the amount of money sufficient to compensate him ought to be very small. And herein, in the endeavor to gain large compensation for small injuries, the malingerer finds reason and excuse for practising decep-

tion in order to magnify his claim. The motive is one requiring great moral courage to resist. Many a man, whose character hitherto has known no stain, has yielded to the temptation, and has thereby lowered himself in general esteem. It is not the language of sentiment but of sober fact, when it is said that whole households are sometimes made miserable by the devices to which it is needful to resort, in order to obtain the desired end. Hopes are conceived of future gain, thoughts are centred on the one aim in view, and there is but a sorry consolation when the day of reckoning has come. So powerful indeed is the motive that you find persons taking to their beds, abstaining from food, shutting themselves up, neglecting their business, and making themselves weak in body and wretched in mind. While, however, this has to be written of those who wilfully malinger, it would be doing many an injustice if we did not recognize that prospective compensation may exert a retarding influence on the process of recovery quite apart from any deliberate imposture. Entitled as he is to compensation, it is only natural and right for a man to feel anxiety, both in his own interests and in the interests of his family, that compensation should be adequate and fair, and a nervous, yet really honest, dread may be engendered lest some mistake be made in the settlement of a rightful claim. The injurious influence of any such nervousness and suspense is sufficiently obvious, and it may sometimes be a matter of no small difficulty to determine whether the protraction and aggravation of a man's illness are really due to one cause or the other—to wilful imposture taking the form of not choosing to recover, or to the unconscious weight round his neck which arises from apprehension as to compensation. I have never known any difficulty, however, in making the honest sufferer understand how and why the settlement of his claim for compensation will, more readily than drugs or change of air, promote his recovery and work only for his good. Some may think that there need not be much regard for the feelings of an impostor.

Curiously alike are the means of deception adopted in different cases, and it is extraordinary how persons in the humbler walks of life possess a knowledge of the kinds of injury, which are popularly deemed inevitable in a collision. Provincial journals are to some extent responsible for this, for in

them are often to be found in considerable detail the history and symptoms of those who, by litigation or otherwise, have received compensation from railway or tramway companies. And if a man has in this way learned that large compensation was awarded for injuries apparently like his own, it is a great temptation to him to adopt courses which seem to him potential of future gain. A publican well up in years made an exorbitant claim for trifling injuries. His enlarged prostate gave rise to the usual symptoms, but when it was pointed out to him that this was the real cause of his urinary trouble, he replied, "No, it is my spinal cord to which all my symptoms are due." "Drag your leg, you fool; don't you see the doctor coming?" called out by a workman to his fellow, who had been in an accident, and heard by the doctor as he was then crossing the yard to see him, was but the audible expression of many a like lesson, which may be learned with ease in the solitude of a sick-room. And as the views of the nature of railway injuries have changed, so also has there been a notable change in the methods of imposture. Ten years ago the malingerer could not walk, or he dragged his leg because of some obscure injury to the spine; nowadays he presents an admirable picture of nerve prostration, for his nervous system has had a severe shock, the consequences of which are readily induced by abstinence from food. This is unquestionably a far better way of malingering than the endeavor to simulate some spinal disease, for the fraud in that case can be soon found out; but in the case of wilful starvation it is only a question of time when your waistcoat will hang flabbily about you, and you can measure at any automatic, and thoroughly trustworthy, machine the number of stones you have lost in weight. It caused no surprise at all that a man, who had been going about on crutches for months, should have led off the dance at a ball which he gave to his rejoicing friends at the close of litigation; but I have heard expressions of genuine amazement at the speed with which the human form divine has sometimes put on flesh.

And yet it is unusual, in my experience, to meet with cases where it would be possible to say with certainty that no injury has been received at all. The pain of some trifling bruise or strain is exaggerated and unduly prolonged, and thence are developed other conditions and complaints, in whose very

obscurity lie the ready means of untruthfulness and deception. The still wide-spread, yet erroneous, impression, that the effects of a railway collision are likely to be remote, does much to foster a sense of uncertainty and alarm, and to give the malingerer scope for the course which he intends to pursue. And so it comes to pass that it is after the most trivial accidents, or in cases where no definite injury has been sustained upon which to base a claim, that we hear most often of the obscure, subjective, and intangible symptoms and complaints, which are supposed to indicate some serious damage to the nervous system, and to forbid all prospect of future recovery. Is it not a strange anomaly, something altogether extraordinary, that it is only the slightest injuries which are followed by these purely subjective symptoms, whose very obscurity gives rise to alarm? Is not some light, however, thrown upon them by the facts of accumulated experience, that these symptoms vanish and the complaints are no more heard when the motive for their existence is at an end? Have we not strong grounds for doubting their genuineness and reality? Are we right in ignoring the absence of early symptoms and signs of injury or shock, and in assuming that a condition is alarming, or a prognosis grave, simply from assurances of the patients themselves? And yet this is what is seen far too often in dealing with cases of alleged injury after railway accidents. Little regard is paid to the early condition and to the actual state of the patient, and undue attention is given to ceaseless complaints of hidden symptoms, whose real existence you should be all the more cautious in acknowledging, being as they are without objective signs, and traceable to no injury met with in the beginning. Time runs on, the complaints become louder and more continuous; and forensic eloquence, it may be, is left to tell a harrowing tale of the frightful collision, and of a nervous system shattered and beyond repair.

I trust that I am not myself lapsing into the "region of nisi prius." These are facts, however, and it would be well if they were more widely known. That cases of severe and unquestionable injury should usually go on to recovery, or to such restoration as the nature of the injury will allow; and, on the other hand, that cases of slight injury, from which recovery without complication or sequelæ is, in other circumstances, the rule, should after railway collision be followed by

innumerable and protracted subjective symptoms on which not a finger can be laid, are facts to arrest attention and to call for explanation. And the simplest explanation is the best. In the one set of cases there is an obvious basis of compensation for the definite injuries received; while in the other there is little or none, and there arise exaggeration and unreality, and subjective symptoms to make the specious foundation of a claim. But enough, perhaps, directly and indirectly, as to the motive for malingering. It is notorious, and it has an all-powerful influence over the course and symptoms of railway injuries.

Let us now learn from definite examples something of the ways of malingerers.

CASE XXVIII.—*Slight Sprain and Nervous Shock—Protracted Symptoms from Wilful Starvation.*—A travelling agent, aged fifty-eight, received, in a trifling collision, a blow over the right iliac crest. He complained to a fellow-passenger at the time, so he said, of being hurt, and of feeling rather faint. There was never any mark of bruising, and his medical attendant—a hospital surgeon well able to judge—thought his injury altogether trivial. The patient, however, abstained from his work; nor did he resume it until eleven months had passed away. During this time he complained of pain about the right hip, which compelled him to use a stick and made him walk lame; of pain in the head; of inability to sleep; of poor appetite and nausea; of constipation; of such general weakness as to prevent him from walking a mile, and that only now and then; of impaired vision, so that he could only read the largest type; of loss of memory; and of incapacity to apply his mind to anything, so that neither physically nor mentally did he feel himself fit for any occupation. He frequently stayed in bed for the whole day, and rarely got up before twelve; for days together he never went out-of-doors, and he took the very smallest quantity of food. Thus he gradually acquired a worn and anxious aspect, and looked pale, thin, and ill. No known means of examination were able to discover any sign whatever of injury or disease; and although he twice undertook journeys of some two hundred miles to be seen by a well-known oculist, could I ever, with the ophthalmoscope, find a trace of disease in his eyes, or any

cause for his loss of vision. No remedies adopted seemed to have the slightest effect upon him. Liniments did not soothe his pain, soporifics did not make him sleep, and tonics improved neither his appetite nor his strength. On only one occasion did he give a clue to the absence of perfect genuineness and reality in his case. To the surgeon who had several times examined him by request of the railway company, the patient one day remarked as he left the house, "You've got a cobweb on your hat, perhaps you'd like to brush it off." He was known to be at this time, and he had been formerly, in pecuniary difficulties. He made a very large claim. This was ultimately settled, and he forthwith went into the country for change of air. He returned home in a fortnight looking and saying that he was in every respect perfectly well. He resumed his work at once, and continued it for many years after the accident. Could recovery in this case have taken place in so short a time had the symptoms and complaints not been purposely induced, maintained, or fabricated? Is it not as well-nigh certain as can be that had not the prospect of compensation held out the temptation to this man to make the very worst of his injury, with the hope of pecuniary profit to himself, he would have been laid up for not more than two or three days? And yet he was an invalid for eleven months —a wretched picture, indeed, of induced malaise; but a malingerer nevertheless, purposely maintaining his condition in order to increase his claim.

CASE XXIX.—*Physical Injuries—Nervous Shock—Early Recovery.*—Two cases out of the same accident, those of a father and son, may be compared. The father, a man in a small way of business, aged fifty-eight, was seen in bed at an hotel in a provincial town the morning after a bad collision. He was unable to give any account of the accident, having been stunned by a blow which had closed both his eyes. He had also a broken rib, and was much bruised elsewhere. He had had about two hours' sleep in the night, had rallied, and felt better. A week later he was still mending, and although he was pulled down by rather severe epistaxis, he was able in twenty-four days to be moved home. There he continued to go on well. In six months his claim was arranged without trouble for a reasonable sum, and when I saw him three months afterward he looked and said he was perfectly well.

CASE XXX.—*Slight Injuries—Prolonged Complaints—No Evidence of Ill-health.*—The son, a strong and powerful man, aged twenty-four, a messenger by occupation, was not stunned, and was able to help his father to the hotel. When seen on the following day he said he had had a good night, but that he felt rather shaken. He had a slight bruise on the right knee, and a simple fracture of the third metacarpal bone of the left hand. A week later, to my astonishment, I found him still in bed, but neither in aspect, temperature, nor pulse was there anything abnormal, and he had been able to eat and enjoy, from the very morning after the accident, three meat meals a day. He was ordered up, and he would have been sent home immediately had not the illness of his father obliged him to stay. When he got home he at once, by the aid of a litigious lawyer, took steps to make an exorbitant claim against the railway company. Two months after his return home he had not yet resumed his work. The reasons assigned for this were that he had giddiness and pain in the head, that his memory was bad and his sleep disturbed by dreams of the accident, that he was very weak and incapable of work, and that he could not trust himself to apply himself to anything. His knee and hand were still in bandages, the arm being carried in a sling. I failed to discover any sign whatever of ill-health about him. Thus he continued to complain and to live in idleness until ten months had flown, when a jury awarded him a sum in reasonable compensation, or about one-fourth of that which he had demanded. He was then to every appearance and test in perfect health, though still complaining as before.

CASE XXXI.—*Slight Shock—Prolonged Complaints—Absence of all Symptoms.*—A man, aged forty-two, strong and healthy, was in two slight collisions. In the first there was no evidence or history of his having received any blow or injury. He stated, however, that the day after the accident he felt weak, ached all over, and had pains in the loins and legs as if he had a cold. No amendment took place, nor had he indeed been free from suffering up to the time when I saw him eight months afterward. He then complained of weakness and fatigue, of bad sleep and loss of memory, and of such great nervousness that the whistle of an engine or the sound of a train threw him into a state of excitement. His manner

was whining, and he made several attempts to cry. His medical attendant had never found any evidence of illness beyond the statements made to him by the man himself. Neither in his general aspect, nor in the action of any one of his organs, could any sign of ill-health be discovered. He abstained from work for fifteen months, and at once resumed it on the settlement of his claim, then grown in size through length of alleged suffering and loss. Two years went by, and he was fortunate enough to be in a second collision in which he received a trifling bruise on one leg. He at once abstained from work, placed himself under medical care, made precisely the same complaints as before, and presented as little evidence of ill-health. Again there were months of idleness, and again on the settlement of claim immediate recovery, and return to work.

Further examples of this particular kind of malingering are hardly necessary, although many might have been given, which, with insignificant variations, have followed the same course. They are often styled cases of "shock to the nervous system." Their chief characteristic is the obscurity, the intangibility, and entire subjectivity of all the symptoms and complaints which disappear at a particular moment. They are not rarely accompanied by some manifest disturbance of health, which is induced by the mode of life to which the individual restricts himself. Can want of proper occupation and exercise act otherwise than harmfully even to a healthy man? Sleep becomes unsound, the bowels are sluggish, appetite fails, the glow of healthy energy and vitality is lost, and there is no longer the picture of perfect health. Be the bodily derangement thereby great or be it infinitesimally small, health and vigor are restored, and work is resumed, as soon as it is no longer incumbent on the man to appear ill and to remain idle, and when the requisite effort to return to a natural mode of life is once more allowed. The man has nursed himself into a state of illness, and has thereby generated a condition of spurious nervous shock, and if he only has the prudence to complain of his back, his case becomes a grave one of so-called concussion of the spine.

Examples of this induced illness are far from uncommon, and the very fact that the patient seems really ill places an additional difficulty in the way of an accurate diagnosis of the

cause. Apart from the necessity of learning what was the precise nature of the accident, and how the man was hurt, it is very essential to know how he passes his time, and what are his habits and occupations day by day. It is of paramount importance to separate objective signs from subjective symptoms. The absence of signs, and the presence of subjective symptoms alone, may fairly warrant a suspicion, which ought to entail the most careful inquiry into all the circumstances of the case. Why is that man in bed? why does he stay for weeks in-doors? why is he taking hardly any food? why is he pale and thin? why does he sweat?—questions such as these the surgeon should ask himself, and he should not rest satisfied with a tacit belief in what he hears or sees.

In other cases there may be a combination of obscure subjective symptoms and of precise objective signs which throw mutual light upon each other, or which perchance may tend to make a diagnosis still more difficult.

CASE XXXII.—*No Injury—Prolonged Complaints—Immediate Recovery on Settlement.*—A traveller by occupation, aged fifty-three, out of employ, took to his bed and called in a doctor three days after a most trifling bump against the stop-blocks in a station. He made the usual complaints of pain, of shock to his nervous system, dimness of vision, loss of memory, and the like, but there was never any sign whatever of ill-health or functional derangement beyond what might be fairly attributed to some atheroma of the aorta. The extravagance of his language and his exaggerated estimate of all his complaints were in themselves enough to raise suspicion as to their reality. Objectively he complained of loss of power in the right arm with stiffness of the right elbow, and of a putty-like sensation of the left leg below the knee and stiffness of that joint. In all ordinary movements, such as undressing or helping himself out of bed, he used the right arm quite as much as the left. It presented no difference from its fellow, though when speaking to him about it he always held it against his side. He resisted with great force when you attempted to bend it, and he called out loudly, as if from pain, when you touched the arm, however lightly, about the elbow-joint. His left leg showed no physical signs of injury or disease about the knee. Held usually rigid and stiff, he resisted

any attempts at passive flexion. Flexion to the slightest degree, he said, caused him great agony, although his face showed no sign of suffering. On another occasion he complained of excessive hyperæsthesia of the left knee, however gently you touched it with the finger, although he pulled up and put down his trousers over it with perfect composure. He complained of great agony in his bladder, although he only passed water at natural intervals and in proper quantity, and he could hold it for six, eight, or even twelve hours. He stayed in bed about ten weeks, and took, as he admitted, hardly any food. Toward the close of the twelve months, during which this state of things went on, he had become somewhat weak and thin. Quite early he had made an exorbitant claim, and the natural result was litigation. While waiting for his action to come on the man was to be seen walking about Westminster Hall with the lame stiff leg, and the flexed arm held rigid to his side. His action over, he there and then resumed a natural gait, all trace of lameness having passed away. Were the subjective symptoms less unreal than those which so quickly vanished ?

Case XXXIII.—*Purposive Vomiting—Immediate Recovery on Settlement.*—Now let us take another case which offers, perhaps, greater difficulties in diagnosis. Omitting details of the usual subjective ailments, the objective signs of illness were frequent vomiting, and such apparent weakness of the legs that walking was only slow and labored. The surgeon who saw the man on behalf of the railway company, and who gave me the history of this case, felt sure from all he saw that the symptoms were far from genuine, and among them that the vomiting itself was a deliberate volitional act. It was, to say the least, a suspicious feature in the case that the patient had been seen, when he thought he was out of sight, to start off at a natural pace, swinging the stick on which he had been compelled to lean only a moment before. Knowing all this, the surgeon felt it his duty to tell the private medical attendant what he thought about the case, and he resolved to do so on the next occasion when they were to meet at the doctor's house to see the patient. Having told his opinion, the doctor pointed out the utter impossibility, in his belief, of so grave a symptom being voluntary, and took him into his own yard to show how the man had vomited since

he came to his house not long before. The surgeon's opinion, nevertheless, remained unchanged, and the result of the case justified and confirmed it. Infirm of body and mind, incapable of work, vomiting up to the day of his action for damages, the man immediately recovered when litigation was over.

In the case of a horse-dealer who rapidly wasted and became extremely ill, and in whom the most prominent symptom was sweating, the man subsequently acknowledged, when his speedy recovery after compensation excited his doctor's surprise, that he had deliberately sweated himself by violent exercise in thick clothing in order to reduce his weight and size.

To those who have never seen such cases it may appear almost incredible that symptoms like these can be volitional and unreal. (Some remarkable instances of factitious vomiting are recorded by Gavin, op. cit., p. 256 et seq.) Take, however, into consideration every circumstance and feature of the case; learn what has been the original injury; recognize how singular it is that a symptom, alarming in itself, should be by itself independent, and without ill result; remember how powerful is the motive for deception; inquire what steps the patient is taking to gain the desired end, and there are the means, if you will only use them, of arriving at a right diagnosis.

The character of the original accident and injury is far too often forgotten in the later examination of these cases, and a trifling bump is magnified into a serious collision.

CASE XXXIV.—*Slight Injury—Gross Exaggeration—Rapid Recovery after Settlement.*—A man received an altogether trivial blow on his side, from the manner in which he happened to be sitting, when the train attached a carriage at a station, and the so-called accident ultimately became a severe collision, in which the train had been backed into a carriage at the great speed acquired in a run of half a mile, with a crash like thunder. This was the story upon which those were asked to form an opinion who were called in to see him, when, after several months, he had nursed himself into a condition of much weakness, nervousness, and malaise, and when his very obvious illness seemed almost to demand a serious

accident as its cause. It is very natural that there should be some distrust in the statements of railway servants as to the precise violence of a collision or other accident. The absolute and unvarnished truth as to the real severity of the accident was known, at any rate, in this case, and was somewhat different from the alarming catastrophe to which testimony was borne in a court of law, where a jury is supposed to get at the actual facts. A large sum of money was awarded to this man in compensation, and he instantly invested it in a business which he proceeded forthwith to carry on himself, with all the appearances of perfect health, and without any further need for medical treatment.

CASE XXXV.—*Simulation of Spinal Injury and False Statement as to Accident.*—A highly respectable frequenter of the turf took to his bed after a very trifling collision. He was unable to give any account of the accident, having been knocked insensible, and been carried in an unconscious state to the waiting-room of a station, distant a quarter of a mile. He had, however, been able to make a long journey home two days after the accident, that is to say, when the races were over; and he at once took to his bed. I saw him on the eighth day. When asked what he complained of, he answered with ready assurance, "Shock to the nervous system, and injury to my spine." He could give no other account than this of his complaints, except that he was wholly unable to get out of bed. Examination, which failed to discover the slightest trace of injury or constitutional disturbance, accidentally revealed that this gentleman had a chancre; and the discovery afforded the excuse for promptly ordering him to get up and walk. His doctor had regarded it as a case of very serious spinal injury. The claim was forthwith settled for a small sum.

CASE XXXVI.—*Alleged Spinal Injury—Gross Imposture.*—This same man subsequently appeared as a witness on behalf of a friend, who had brought an action for damages for a like alleged injury in the same accident. He was a most valuable witness, for he swore that he and another man had carried their friend, then perfectly unconscious, from the scene of the accident to the waiting-room at the station. The friend, an even more outrageous impostor, had had a slight bruise on one hip. He also finished his mission at the races, came home, and at once took to his bed, complaining of his spine. "The

pain in his back," so ran my report some weeks after the accident, "is so bad that a longer stay than half an hour out of bed is, he says, almost more than he can bear. His pulse is perfectly tranquil, his temperature normal, his aspect not that of ill-health or urgent suffering, and the appetite and bodily functions are as good as can be expected in any one who has so long been without appetite and in-doors. It is my conviction that he is grossly exaggerating his symptoms and complaints. There is no evidence whatever of injury to his nerve-centres, either cerebral or spinal; nor is there any ground for believing that there is any real tenderness of his spine, for wherever I touched him, whether on the spine itself, on the muscles near it, or on the ribs far away from it, there was the same unreal hypersensitiveness and manifestation of suffering. That he has some pain here and there is quite probable; but there is no disease such as to call for his stay in bed or in the house for another day." It need hardly be said that litigation ended this case, which was a highly profitable one for the lawyers.

Three years afterward it was learned from this man himself—perhaps in the circumstances the least trustworthy source of information—that his case from beginning to end was a fraud, that he was never hurt at all, and that no amount of money would induce him to go through such a course of illness and confinement again, or to endure such suffering as he had at the hands of those who deemed it necessary to run pins into his legs and to apply the "electric test" to measure his assumed insensibility. I venture to say that no such "tests" were ever needed, and that their tendency was only to confuse and obscure what ought to have been sufficiently obvious to every one who saw the patient. How fallacious they are, and in this case were, it is superfluous to point out, and yet they were solemnly given in evidence in court as conclusive signs of the serious nature of the man's disease.

Then, again, there is a class of cases where the patient may simulate the mimicries of disease. There are none in which it is more imperative to know something of the patient's history, of his previous health, his position in life, his condition immediately or soon after the accident, the nature and extent of the accident itself, and the whole aspect of the case from beginning to end.

CASE XXXVII.—*Slight Injury—Prolonged Simulation and Rapid Recovery after Settlement.*—T. J., aged forty-three, was in a slight accident, in which he had a small bruise on one cheek and also at the back of the head. He was seen shortly after the accident, but there was no sign either of injury, beyond the bruises named, or of constitutional disturbance. In about ten days he was "taken worse," but in no very definite way. He gave notice of a claim, and then began to complain indefinitely of pain in the back, of pain in the legs, and oppression in the head. There was still, however, no evidence of illness or constitutional disturbance. He continued to get worse, and two months after the accident took to bed. He had not been in bed many days when he had a "bilious attack," with constipation and vomiting. A month elapsed, and he then was seized, so he said, with a "convulsive attack" in which his legs were drawn up, and he was very violent. From that time forward he professed to be troubled with "contractions of the limbs and severe pain in the legs, aggravated by attempting to sit up." He also complained of queer sensations all over, numbness in his tongue, for example, creepings in his legs, tenderness of the palms of the hands. Pulse and temperature alike remained perfectly normal. Five months after the accident he was still in bed complaining of great pain in his back, of pain and tenderness in the legs, and of inability to stand if he got out of bed. He held his hands out somewhat in the position of tetany, but the contraction immediately disappeared when he ceased to direct attention to it. Although when he first got out of bed he allowed his legs to slip away and himself to fall, he only had to be engaged in conversation to show that his legs were amply strong enough to support his whole body. There were no objective signs whatever of paralysis, nor was any illness to be discovered about him, except such as might fairly be accounted for by his having been in bed for three months. Thus his muscles were somewhat flabby, his face was pale, and this tongue was furred. Temperature and pulse, however, were normal; his pupils were of healthy size; his mind was perfectly clear. So his state continued until the close of a year, when his claim was settled by compromise on the verge of litigation, it being held that he had received a very severe injury to his nervous system, that prospect of recovery was very small, and that it

was wholly impossible for him to appear and give evidence as plaintiff at the action. His evidence was indeed taken by commission, the man being quite unfit to leave his bed. He had made a very large claim—not the first in his life, for he had received compensation for alleged injuries some years before. Mark the sequel. In ten days he was out-of-doors, in a fortnight he went away for change of air, and in two months he resumed his usual work. He has continued at work since that time in the enjoyment of good health.

In instances such as this it is often difficult, and well-nigh impossible, to say whether the condition is one dependent on genuine neurotic disturbance or is altogether feigned. And the difficulty is largely due to the fact, that a disorder of this character may be more or less under the control of the patient himself, as it has been pointed out on a previous page. It is therefore of the greatest importance to search for some symptom, which may rightly be placed in the category of hysterical or emotional disorders. Every objective sign that you discover may be under the patient's own control, may be a physical condition altogether assumed, and the clue to the whole case may be entirely wanting until some symptom be found, which is outside, and beyond his voluntary control, or is even unknown to him. Anàlgesia or anæsthesia, for example, may form the only indication of the real character of the disease. Dr. J. Putnam has admirably dealt with this aspect of the subject in a paper on "Recent investigations into the pathology of so-called concussion of the spine, with cases illustrating the importance of seeking for evidence of typical hysteria in the chronic as well as in the acute stages of the disease" ("Boston Med. and Surg. Journal," Vol. CIX., Sept. 6th, 1883). After recording two cases of hemianæsthesia in men, he says that this is a symptom which shows that the nervous system has, in all probability, been subjected at some past time to a considerable perturbing influence, and its presence or absence might prove a welcome aid to diagnosis. A symptom of this kind may throw light upon a case, but it does not necessarily exclude a considerable degree of wilful exaggeration or even downright fraud in the other symptoms and signs. A deliberate impostor, for example, lost all tactile sensation over the mucous surface of his nares, a symptom which

it would surely be impossible to feign, and which was a clear evidence that some effect had been wrought, somehow and somewhere, upon the nervous system. Regions of anæsthesia, moreover, which follow no recognized anatomical distribution of nerves, say of one leg up to a precise limit at the knee or half-way up the thigh, are occasionally present, and it is obviously very desirable that no symptom of the kind should be overlooked in the examination of those cases where absence of the ordinary indications of illness and disease may suggest malingering. Marvellous and deeply interesting are such manifestations of the close interdependence of mental and bodily states, and, freed from the incubus of compensation and the temptation to malinger, it may be said of the nervous consequences of railway accidents, that they are not unworthy of the study of the ablest and most philosophical men in the profession.

We have nothing to do here with the pathology of morals, nor need we gauge the different degrees of moral obliquity in undoubted feigning and assumption of disease, and in wilful exaggeration of real conditions as a means to compass some aim in view. Were all cases of simple exaggeration to be included under the same head as cases of fictitious and feigned disease, the material would from very bulk become unmanageable. If, as it has been said, the motive be so strong and so prevailing, it is natural and only human that exaggeration should be met with in a large proportion of the persons injured in railway accidents. But, on the other hand, it must be remembered that exaggeration may not be, nay, very often is not, altogether wilful or assumed. Exaggeration is the very essence of many of those emotional or hysterical disorders, which are so common in both sexes after the shock of collisions. Here it may be an idiosyncrasy of the individual; there it may be the outcome of mental disturbance from the fright and alarm amid which the injury was received. It is only by a consideration of every feature and aspect of the case—clinical, pathological, social, and moral—that you can rightly estimate the kind of exaggeration or malingering with which you have to do.

CHAPTER VIII.

THE MEDICO-LEGAL ASPECT OF RAILWAY INJURIES.

It may not be altogether without advantage if a few concluding remarks are made upon those circumstances which are special in, and peculiar to, the class of cases considered in this book, and which are commonly absent from the ordinary accidents and diseases met with in every-day practice. Every case of railway injury is more or less the subject of medico-legal inquiry, for the extent of the injury itself and the loss which it entails have to be estimated, as far as possible, by a money value which is paid as compensation, and difficulties or disputes, which may arise in arriving at this estimate, may occasionally entail an appeal to a court and jury by process of litigation. All this may very materially modify the clinical aspect of individual cases and symptoms, and no right estimate of any case can be made if these circumstances are ignored.

At first sight, perhaps, it is not very clear why compensation should be an element of importance in the course and history of the spinal and other injuries received in railway collisions. Let us picture for a moment the change which would come over our hospital patients if a pecuniary value were to be placed upon every injury they sustained. The probability that many of them would see only the worst side of their ailments, that they would lay undue stress upon their pains, and would exaggerate the term of prospective disablement from work is at once obvious, were these to have a place in calculating the money-worth of the injury received. When a man has been prostrated by illness or injury, and convalescence has at length set in, we know that he must make some voluntary effort to regain his former activity both of body and mind. His habit of work and the daily routine of his life have both been interrupted, and it depends very largely upon his own efforts how soon and how successfully the thread shall be

taken up again. It is clearly to his interest to get well as soon as he can, and experience tells us that so keen is the desire for recovery and renewed activity, that many a man's restoration to perfect health is often retarded by his having begun work too soon. Suppose, however, that compensation is to be awarded for every ache and pain, and for every day that he is absent from his work, it is only natural that the keenness of his desire to resume his work should be very much diminished. If our hospital patients were to be compensated, we may be sure that the features of many a case would be completely changed, and that the whole clinical history of disease would wear a very different aspect from that which is usually seen. And changed for this reason, that compensation acts as a let and hindrance to the natural and very necessary effort, which each person must make for himself toward convalescence and resumption of work. It may do so quite unconsciously, for the knowledge that compensation will certainly be paid him for the injuries sustained in a railway accident tends from the first day of illness to give a tone to his feelings and to affect his own impressions of the sufferings which he may have to undergo. He is less likely to take a hopeful view of the future, is more prone to be despondent about the prospects of his recovery, and insomuch will his own personal efforts be weakened. It is well that this matter of compensation has no place in every-day hospital practice, and you will always do wisely, in endeavoring to form an estimate of the cases which involve medico-legal inquiry, to revert to your hospital experiences, and to recall the usual history of your hospital patients, both as to suffering and disablement, and the prospects of recovery.

It is not sought here to establish any doctrine so absurd as that settlement of claim can of itself be a curative agent, in the sense that it can hasten the setting of a fracture, remove the pain which is an inseparable concomitant of sprain of the vertebral muscles and ligaments, or restore the nervous tone which has been upset by the shock of a collision. The natural forces here, as elsewhere, tend to restoration of health; and recovery is, happily, as perfect after the injuries commonly received in collisions, as it is after any other kind of injury which the surgeon may be called upon to treat. There is this difference, however, and it is a great one, that when the

immediate effects of injury are passing away, and there is every sign that convalescence has set in, compensation holds out an inducement to the patient not to make the requisite effort to resume his work and his ordinary avocations, which are in themselves the best means of crowning the period of convalescence and of restoration to health. Had the ordinary injuries of hospital and every-day practice to contend with this element, convalescence would be very much hampered and prolonged, while if there was no question of compensation to enter into the contemplation of railway injuries, these in their turn would be recovered from with no less certainty and with much greater promptitude.

Human nature would not be what it is if compensation did not exercise this influence in delaying recovery, and it may do so even in the case of those who have been really hurt, and who are genuinely anxious to get well. Too much stress ought not, however, to be laid upon compensation itself, for very often it is the unsettlement of mind incidental to the arrangement of the claim, rather than the prospect of pecuniary gain, which is exerting an injurious influence. Happily the medical man is not often called upon to determine whether his patient is consciously making use of his injuries for the purpose of profit, or is the unconscious victim of this mental unsettlement, but he very frequently has to determine whether it is likely to be for his good that his claim should be arranged. Suppose, for example, that several months have elapsed since the accident, and that while there are no fresh indications of injury the symptoms nevertheless continue without amelioration, experience shows that settlement of claim is, in all probability, the one and only thing required to start the process of convalescence with reasonable hope of speedy recovery. Every now and then, however, there will come a case in which it is desirable that the claim should be settled soon after the accident. Money may be wanted to tide over the period of disablement and to insure the comforts necessary during a time of illness, or it may be obvious that there is great worry and anxiety as to the prospects of recovery and the future support of the family. In such circumstances it will not be the less beneficial to a man to have his claim settled, but additional care is necessary that in doing so he suffer no injustice. I think that a claim for severe injury ought never to be settled

at this time, whatever be the want of money, unless there is reasonable ground for honestly believing that no fresh symptoms indicative of a more serious injury than is then apparent are likely to become developed. Given such conditions, however, arrangement of claim is likely to be advantageous to the patient, provided that a fair basis for settlement be made by allowing for a certain period of probable future disablement. And this period has to be defined by the medical men after an impartial consideration of all the facts of the case. To lay down here in a book any hard and fast rule is manifestly impossible, as likewise it is well-nigh impossible to describe the indications for arrangement of claim as a remedial agent. At the bedside, however, there is not much difficulty in deciding whether arrangement of claim is advisable, and likely to be followed by good, or the reverse; nor is it I think very difficult to say beforehand whether the settlement of claim will be followed by immediate recovery, or will only act remedially by conducing to settlement of mind. It is, at any rate, quite erroneous to jump to the conclusion that a man is a swindler, simply because he recovered soon after getting a check from the railway company; and there need not be the smallest imputation upon a man in telling him that he had very much better arrange his claim, and that in all probability if he does so he will soon be well. I have many times been assured by compensated persons themselves, that the moment they got the thing settled they felt quite different beings, and, simply because the matter was off their minds, at once began to improve. And this, too, in cases where there has been severe and genuine disturbance of health. Here is a case in point.

Case XXXVIII.—*Slight Injury and Nervous Shock—Anxiety as to Claim and Delayed Convalescence.*—W. A., a stout elderly man, was in a rather severe collision. He was unable to continue his journey after the accident, but in two or three days he began to have pains in the back and to feel himself shaken, weak, and ill. He then returned home, a journey of four hours, and went to bed. There were no signs of injury other than those of slight sprain of the muscles of the back, with general nervousness and loss of tone. He steadily improved, and in two months it was thought that he was sufficiently well to arrange and settle his claim. He then, how-

ever, began to complain more; and four months after the accident he looked worse than hitherto, appeared ill and anxious, expressed himself unable to leave the house, and wholly unfit even to think of resuming his business. This went on for several months, and instead of any improvement taking place, he began to look more aged and worn, and not having been out of doors for a long time, lost appetite and weight, became prone to cry, and altogether presented an aspect so unhappy, that an opinion was given that he was permanently injured from "concussion of the spine," and would never be fit to do anything again. There were, however, no symptoms of serious illness or disease, and settlement of his claim was confidently anticipated as the one thing essential to restore him to health. Nine months passed without a shadow of improvement, and his claim was at length arranged. In a very short time he was perfectly well, looked in good health, and "ten years younger" than before his claim had been settled. Nor was this improvement transitory. He continued in perfect health, and five years after the accident was following his occupation with his usual vigor and in his former state of health.

A case, it may be suggested, devoid of all color, and wanting any tangible symptom at all, if we exclude the pain in the back which in former times was pretty sure to conjure up "concussion of the spine." But it is just these colorless cases which are often the most difficult of diagnosis, especially to those who have never seen anything like them before "I cannot make out," his doctor says, "why this patient does not get well. He seemed to mend at first, and I thought he was going to get over it soon, but now he appears to have no energy at all. Medicines don't do him any good. I urge him to make an effort to get about and try a little business, but he says he cannot; or if he does, that he breaks down again almost before he has begun." Complaints like this would not be heard quite so often, perhaps, were this clinical fact more fully recognized, that settlement of claim is frequently the most important agent to bring about recovery.

You need not seek to inquire too closely into the rationale of the change which may be thus induced. There is a release from the mental worry and annoyance inseparable from any long dispute, and a feeling that now, the whole trouble being

over, a fresh start is possible, and that persistent effort may once more be made to move about and resume work. Doubtless also there is some satisfaction in placing a good round check to your balance at the bank, which, in this age of progress and poverty, exerts a stimulus which no pharmacopœial preparation can supply. The attitude of the patient's own thoughts is wholly altered. Before compensation was effected he held out a goal to himself, and thought, and said: "When my claim is settled I will try and resume work; but I will wait and see how I am." When his claim has been arranged he argues thus: "Now I must begin my work again, and do the best I can." The effort, at all events, can at length be made, and with each succeeding hour of activity and occupation there grows up a healthier tone, and the rôle of the invalid is laid aside.

It is not only in cases like these, however, that settlement and repose of mind conduce to speedy recovery. A like result may be seen elsewhere; and it is a well-known fact, that the health of prisoners in jail has unquestionably improved after they have received their sentence, even though the sentence may have been far more severe than they had expected.

While, then, we cannot ignore the influence of this restorative agent, we must be more careful than ever that our knowledge of its efficacy be not improperly applied. An accurate history of the injury, and of the accident in which it was received; a careful observation of the patient's condition immediately after the accident, and of his progress in the days and weeks which followed; an impartial comparison of his case with others of a like kind which have been met with before—these things will guide to a right estimate of the facts when recovery seems to be unduly slow, and when examination reveals no signs of disease to account for the delay. And, although it does not fall within his province or business to deal with the matter in any way, it is yet necessary for the doctor sometimes to know what steps the patient is taking to obtain compensation, and how far this question may presumably be engaging his mind.

It must be remembered, however, that, although compensation has this influence upon the recovery of patients about whose *bona fides* there may be no suspicion, with others it may act as an irresistible temptation to wrong. Hence arise

some of those difficulties which surround the clinical inquirer, and which entail obvious duties and precautions on the medical man. He must endeavor to hold the balance as evenly as may be between the two sides which are more especially concerned in every medico-legal inquiry; and it behooves him, above all things, to take care that no affection of coincident origin, nor any precedent deformity or disease shall be allowed, through ignorance or carelessness on his part, to form an item in the claim which the patient may think fit to make for the injuries he has sustained.

You can never tell how readily a patient may adopt a suggestion which has been unwittingly put into his mind, or how soon an unguarded word or opinion may give a tone to the symptoms which they would not otherwise possess. Avoid, therefore, as far as possible all leading questions, because the use of them may suggest symptoms which had no previous existence. In a gross case of fraud which fell under my notice, a grave opinion was formed of the symptoms because a leading question prompted an answer which was wholly untrue. The man complained of giddiness; and as vertigo was known to be often the result of diplopia, the patient was hastily asked if he saw double. "Yes," was the reply; and led on by further leading questions, a very serious train of alleged symptoms was revealed. Not one of them was true.

The clever impostor who, some years ago, went the round of the hospitals, and simulated many nervous disorders with varying degrees of success, lacked in his marvellous exhibition of tetanus the usual rigidity of the abdominal muscles. A remark was made at his bedside, when he was in one of the worst of his seizures, that it was strange the tetanic spasm, so extreme elsewhere, should not also affect the muscles of the abdomen. The next day they were as hard as a board.

Not less important, also, is it to avoid the unnecessary use of leading methods of examination. I would not in the smallest degree detract from the value of instruments of precision, but their use is often quite unnecessary, the cases being singularly few and far between which demand the whole armamenta of the specialist, who with dynamometer, æsthesiometer, audiometer, lenses, and battery, finds out some trifling departure from the normal which may be made the unfair groundwork of a claim. ("Were a pathologist," writes Dr. Moxon [Croo-

nian Lectures, "Lancet," Vol. I., 1881, p. 568], "with a grave microscope to spy through all our brains as we sit here in states of satisfaction, he would certainly see a great deal in the way of tortuous capillary and dots of yellow pigment—a great deal that under the microscope would look very alarming.") Of what earthly use are observations by the dynamometer, for example, unless you know that the patient is telling you the truth? You discover, forsooth, that he squeezes with a force of fifty pounds with his right hand and of ten pounds with his left, and you forthwith create the scientific and incontrovertible basis of a lie. A little common sense is often of more use in diagnosis than all these instruments put together.

Nor is electricity, as a method of precise and scientific examination, at all exempt from these remarks, unless it shall have been made use of by those who are perfectly conversant with it in all its details, and with the numerous fallacies which underlie its application. Years ago, when railway injuries were more often the cause of litigation than they are now, it was by no means uncommon for evidence to be given in court that the "electric test," as it was called, had been applied, and that the patient, because he could not feel, was of necessity suffering from incurable central disease. Scientific evidence has happily improved, and it is recognized now that cutaneous anæsthesia has no such deadly meaning, and that in order to make proper use of electricity in diagnosis it is essential to exclude those states of the skin, which prevent the reaction of the muscles being determined by application of electricity to them through the cutaneous surface. For when patients have been long confined to bed, and from one cause or another, from genuine fear of moving, from a supposed inability to move or from a resolve not to move, have kept their legs at rest, there is likely to be considerable diminution or even loss of cutaneous sensibility. The "electric test" is, of course, useless in such circumstances, and because there is no response it is altogether erroneous to conclude that there is grave organic disease. We may perchance have to do with a case of hysterical anæsthesia, and we must look to accompanying conditions to help in diagnosis. The reflexes are present, there is no trophic disturbance in any part of the limbs, and above all, if the electric stimulus be brought into contact with them, either directly by needles, or after proper preparation of the

skin, it will be found that the reaction of the muscles is quite natural. Hear what Dr. Buzzard has to say on this point. After describing a case of hysterical paralysis, he writes: "In this case, as I have seen in many belonging to the class of hysteria [the very cases that are so often seen after railway collisions, functional disorders of motion and sensation, and occasionally real imposture], the epidermis, which had arrived at extraordinary thickness, apparently from disuse of the limbs, offered great resistance to the passage of electric currents. In these circumstances a more than usual amount of care in thorough soaking and rubbing of the skin, as well as in selecting the motor point, is necessary in order to avoid fallacies." ("Clinical Lectures on Diseases of the Nervous System," p. 118, Lecture V., "On the Differential Diagnosis between certain Hysterical Conditions and Myelitis.") The difficulties involved in the application of electricity are well indicated by the same author in a passage worthy of quotation: "We never see in hysteria the various muscles of one limb showing differing degrees of abnormality in their response to faradaism, from a condition of total absence of reaction in some, to nearly a natural state in others. Moreover, in hysteria, according to my observation, applications of electrical stimulus (and especially of the voltaic current) on one or two occasions usually suffice to restore the natural excitability of the muscles (equally in all) which has simply declined through disuse. A difficulty can only arise where the observer has but one opportunity of testing the electrical condition, and it is then quite possible to occur. It must be remembered that, as a distinct lowering of faradaic excitability almost invariably signifies organic change in a nerve trunk or centre, a diagnosis of hysteria can never safely be arrived at while that condition persists. On the other hand, I need scarcely remind you that the preservation of a completely normal faradaic excitability in the muscles of a limb does not show that that limb is not paralyzed. . . . In cases of paralysis, it is only when the integrity of the gray matter of the anterior horn is disturbed, or when there is some lesion of the anterior root or trunk of the nerve, that you find decided loss of electric excitability. You frequently meet with complete paraplegia and yet all the muscles will respond normally to electric currents" (op. cit., p. 100).

In the use of electricity for diagnostic purposes, therefore, we must not be content with the negative evidence merely of cutaneous insensibility, or absence of response in the muscles: we must look for some such indication as is given by the reaction of degeneration, or by the different reactions of various muscles in the same region. If these and similar points are borne in mind there will be little likelihood of the electric test being vaunted as an infallible witness in a court of law, and the real position of electricity as a means of diagnosis will be less liable to be shaken by conflict of testimony.

Conflict of testimony, in other words differences of opinion, must inevitably arise in many cases of injury or disease, and the maladies considered in this book are not exempt from it. It might be well, perhaps, when litigation has been resorted to for the settlement of the pecuniary compensation, if medical men were to be freed from the necessity of giving evidence on medical matters in open court. I do not intend, however, to say what are my views upon the subject in this place, nor how in my judgment the practice of the courts might be improved. Suffice it that testimony has still to be given in court, and that in giving it the medical witness ought never to forget that the reason for his evidence is to enable the court to arrive at a just and impartial conclusion. If he is himself a partisan, it is obvious that his testimony is of small value for the purpose named; and of one thing he may be certain, that, if a partisan, he is tolerably sure to reveal his bias almost as soon as he opensh is mouth, and that his testimony will be estimated accordingly. Judge and jury will alike put it aside. "Expert testimony" ("North American Review," 1884, p. 609, "Expert Testimony," by W. W. Gooding, quoted from Dr. Wilbur, of Syracuse, N. Y.), it has been well said, "should be the colorless light of science brought to bear upon any case when it is summoned. It should be impartial, unprejudiced. There should be no half truths uttered, and suppression of the whole truth is in the nature of false testimony." It is true that our present methods render the position of the doctor very often difficult, for the warfare of counsel and the arts of cross-examination tend to throw into strong and undue relief the slightest differences of opinion, and lead too often to the witness saying more or less than he intended to say. Patience, impartiality, good temper, a sense of justice, and a

single purpose to give utterance to the truth—these and, not less than these, a sound knowledge of the matter on which evidence is being given—will together be his best protection in the witness-box, and will make the taunt that doctors differ absolutely harmless to him. This is what Chief Justice Clinton said on the evidence of medical witnesses in courts of law ("Buffalo Medical and Surgical Journal," Jan. 1st, 1880): "As to the delivery of testimony by you as experts, I have very little to say that might not just as properly be said to a witness who is called to testify only as to the facts of the case. The difference rests in this: the expert, as such, is asked only for his opinion upon the facts. He may be asked his opinion upon a hypothetical state of facts, and required to give reasons for the opinion he expresses. The cross-examiner is allowed great latitude, and I am sorry to say not infrequently abuses it. But if the witness will only remember the worth and dignity of his profession, and that he is there simply to speak truth, as a servitor of justice, no arts or sneers of counsel can disturb him. Calm and self-possessed, he will answer every question, direct or cross, fully and in the plainest and most lucid language in which the meaning of the answer can be conveyed to the jury. To such an answer he will add nothing, unless it be a necessary explanation. He will not air his learning before the court, nor have any the least contention with counsel. The court will, if need be, protect him from the abuse of lawyers. Such a witness will return from the stand as calmly as he went upon it, approved by his own conscience, and respected by the court, the jury, and the bar."

CAUSES AND PREVENTION

OF

PHTHISIS.

BY

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THE CAUSES AND PREVENTION OF PHTHISIS.

CHAPTER I.

PATHOLOGY AND AFFINITIES OF TUBERCLE.

TUBERCLE, in its various forms, at the present day, carries off annually nearly 70,000 persons.

In the form of phthisis, at ages between 15 and 45—the most useful stages of human existence—it kills more than one-third of the people who die, and nearly half between 15 and 35.

Moreover, in its prolonged and painful course, it either prevents its victims from earning their livelihood, or at least interferes greatly with their daily work. Its habit of seizing upon the flower of the population; its slow, but, in the majority of cases, almost certain, progress toward death; the distressing weakness and suffering of the last few weeks or months of existence; all these are features in the fell disorder that render its study all-important, not only to medical men, but also to statesmen, and to all who are concerned with the welfare of the nation.

It is, perhaps, hardly necessary in the present instance to defend the thesis, that phthisis is both curable and preventible. A great change has of late years been wrought in medical opinion upon this subject. Up to quite a recent period, not only was consumption supposed to be incurable, it was also regarded as almost inevitable. Families in which existed a taint of the disease were supposed to be doomed to lose some of their members from this cause. Insurance offices still refuse to enroll upon their books those who have lost a father and mother from the disease; and even collateral relatives, who have died from it, are judged to have an influence upon the candidate for assurance.

The fate of the consumptive himself was also generally

regarded as hopeless. It must be in the memory of most of my readers to have seen the recognition of even the early stages of tubercular disease regarded as equivalent to a sentence of death, and the dictum of Sir Thomas Watson, that "tubercular disease, when established, is beyond our power,"[1] was currently accepted as the truth.

These views of the inevitable character and the incurability of phthisis are now altered. Thus Niemeyer remarks:[2] "Many a patient gets well who would formerly have been assumed to be the victim of tubercular, and therefore incurable, disease." Dr. Pollock shows[3] that "many cases which were given up by doctors, but outlived the prediction to arrive at old age, were undoubtedly recoveries from phthisis. Many more were instances of an early invasion of the disease, with subsidence of, and long toleration of, the deposit;" and again (p. 17), "the best authorities lean to the opinion that tubercle is capable of removal by absorption."

In his work on pulmonary consumption (p. 324), Dr. C. T. Williams gives, as the result observed in private practice, that "a cure was effected in 4.6 per cent of the cases; great improvement in 38 per cent; the disease was stationary in 13.4 per cent; but in 43.5 per cent there was more or less increase."

I have myself a list of more than 40 persons, who have been under my own observation for many years, in whom the disease has made no progress and who may therefore be considered as practically cured.

The evidence derived from post-mortem examinations of adults who have died of other diseases than phthisis, also shows that a very large percentage of persons have suffered and have recovered from tubercular disease of the lungs.

My colleague, Dr. Harris, has himself investigated this subject, and found that in at least 39 per cent of the autopsies at the Manchester Royal Infirmary, there was evidence of cured phthisis. He also refers (in a paper on the curability of phthisis)[4] to the researches on this point of Cruveilhier, Rogée, and Dejerini, 50 per cent of their cases having shown signs of caseous and calcareous formations. Bollinger, in 256 similar cases, found 27 per cent with evidence of healing; Standacker, 26 per cent; and Marsini, 39 per cent. Evidently a very large proportion of our population suffers from tubercular disease and recovers from it.

With regard to the preventibility of the disease, still less can any doubt prevail. In the last 30 years, if we take the returns of the Registrar-General as our authority, the annual rate of mortality from phthisis has been reduced by more than one-third. In the three years 1858–60, the rate per million of persons living was 2,567, in 1888 it was only 1,541, a diminution of more than 1,000 per million, and, if we take the population as over 29,000,000, this means a saving of about 30,000 lives every year, from this cause alone.

Nor is this improvement confined to England. "In 1857, 39.50 deaths from consumption were returned in the State of Massachusetts for each 10,000 of the population; in 1883, only 29.90. This decrease is too large to credit to greater accuracy in diagnosis and to the transference of consumption to other States, and is mainly attributable to the prevention of phthisis by improved hygiene."[5]

Evidence has been also forthcoming, of the strongest kind, of the influence of sanitary measures, and especially of good drainage and good ventilation, as preventive of consumption.

No better instance of this could be found than in the records of the mortality from the disease in the British army and navy. This evidence was collected by the commission on the sanitary state of the army, 1858, and the results are shown in the following table, which has frequently been quoted before, but which can hardly be too often brought before public notice. This mortality is given at several stations for several successive periods, and I think that you will be at once struck by the enormous death-rates among the troops in the earlier periods and at every one of the stations, and the great reduction of the rate in 1874. At the present time it is still further reduced. In 1883, it was only 6.28 per 1,000, and throughout the world only 9.57.

TABLE I.—*Mortality per* 1,000 *of strength.*

	1830 to 1837.	1837 to 1847.	1863 to 1872.	1874.
Household cavalry,	14.5	11.1	9.17	8.79
Cavalry of line,	15.3	13.5		
Foot guards,	21.6	20.4		
Mediterranean stations,	21	16.4	11.2	7.27
Canada, etc.,	23	17	9.49	6.0
Jamaica, etc.,	91	59	17.5	16.9
Madras, India,	52	—	24.2	14.22
Bengal, "	44			
Ceylon,	49	—	21.95	6.04

Rates of mortality at the same ages prevailing in healthy country populations,	7.7
In England and Wales,	9.2
In Manchester,	13.4

The greater part of this excessive mortality was due to consumption. Dr. Buchanan, now medical officer to the Local Government Board, has also shown conclusively that good drainage of a locality may diminish by one-half the prevalence of the disease, as in the case of the city of Salisbury.

These instances may suffice to show that we are entering upon no barren quest in searching for means, to reduce still further the mortality from consumption.

So much has already been said upon the subject, that it might well seem somewhat presumptuous in me to attempt to re-tread the path that has already been opened up, and so well explored, by men like the two Williamses, Southey, Ancell, Treves, and a host of others.

Every organ and every structure of the tuberculous subject has been carefully examined, weighed, and measured. Their tissues have been searched for abnormal signs, and analyzed to discover alterations in their chemical composition. The blood and all the fluids have likewise been scrutinized by the aid of the microscope, and subjected to chemical research. The functions of the living body have been watched in all their phases—in brief, all the forces of the animal economy have been reckoned up, and the special pathology of tubercle thoroughly searched out.

But medical science does not stand still, and since most of the work thus alluded to was performed, great additions have been made to our knowledge of the subject.

Koch's great discovery alone would have rendered it desirable, and even necessary, to pass under review the older researches into the etiology and prophylactic treatment of consumption.

It is now eight years since Professor Koch succeeded in demonstrating the existence of a specific organism in all tubercular diseases. By pure cultivations of the bacillus, and by numerous experiments upon animals, he may be said to have fully proved its essential relation to the disease.

But, notwithstanding the confidence inspired by the character and methods of the discoverer, some little time was

needed to establish the truth, and to obtain confirmation of his observations by others.

The early years after a great discovery are often thus taken up with its verification and its application to previously ascertained facts. The master-builder has laid a head corner-stone, and other minor workers are busily engaged in raising other portions of the edifice to its level.

Such an epoch is now before us, and the full effect of Koch's great discovery, upon our estimate of the secondary causes of phthisis, has even yet hardly been correctly ascertained.

The earlier years after 1882 were, in fact, mainly occupied with the researches of rival pathologists. Aufrecht, Spina, Klebs, Schottelius, Eberth, Malassez, and Pignal, and many others, discussed the essential influence of the newly-found organism, and the possibility of zooglœa-like forms of tubercle, or of pseudo-tubercle.

Clinical researches were undertaken in all countries, notably in England by Watson Cheyne, Dreschfeld, and C. T. Williams; in France by Chantemesse, Duguet, Gosselin, Héricourt, and Warlomont; in Italy by Celli, Cavagnis, Guarnieri, and Voltolini; in Germany by Baumgarten, Biedert, Langerhans, Veraguth, and a host of others.

Numerous experiments on the inoculation of tubercle bacilli were undertaken, and researches were made as to the presence of the virus in milk and other foods, in the air, in dust, in walls, and even in house-flies. Some of these will have to be reviewed later on. On the whole, it may be said that Koch's position has been only more firmly established by these observations, and that it must be acknowledged that, whatever may be its mode of working, the tubercle bacillus is the specific cause of the disease.

I can hardly hope to add many stones to the still unfinished work; but at least it may be of some advantage, to attempt to bring into one field of view the various facts bearing upon the natural history of the organism, its favorite haunts and breeding-grounds, the soil most favorable to its growth, the food that will nourish it into virulence, and, most important of all, the conditions under which it may be robbed of its power for evil.

One consequence of the successful search for the vera causa of tubercle, and that perhaps not the least important, is, that

it thrusts aside all former speculations as to the nature of tuberculous growths.

There is now no need of learned and elaborate inquiries as to whether tubercle is "a blastema, coagulating near the vessels from which it exudes,"[6] or "a deposit of specific tubercle cells,"[7] or "a retrograde metamorphosis of tissues,"[8] or "a lymph-tumor, a new growth arising out of connective tissue by endogenous multiplication,"[9] or "a retention in the blood of degenerate substances,"[10] or "lymph, malformed, oxidized, and precipitated from the blood upon contact with air."[11] All these surmises are now of interest mainly as matters of history. Scrofula and phthisis have also been shown to be due to one and the same cause. Lupus is recognized as tubercular disease of the skin; and the various forms of tubercle itself are seen to be due, primarily, to the extent of the irritation caused by the presence of the parasite and its products; secondly, to the efforts made by the surrounding parts to resist the invader.

The essential pathology of phthisis may, in fact, be stated very briefly. Dr. C. T. Williams says: "Reaching the alveolus through the breath, the bacillus enters the epithelial cell and causes proliferation by irritation. The alveolus becomes stuffed with cells, and if the irritation be a gradual process, it gives rise to a highly nucleated product in the giant cell. If the irritation be great, caseation is rapidly produced, though whether this be due to necrobiosis from overcrowded proliferation, or, as Dr. Watson Cheyne thinks, to a chemical change in the cells, brought about by the action of the bacilli, is not yet determined."[12]

Dr. Watson Cheyne himself says: "Bacilli are inhaled into the air-cells of a lung which is in a fit state, whether by predisposition or otherwise, for their growth. They at once attack the epithelial cells, and, in the first instance, cause their hypertrophy and multiplication. The bacilli growing in these cells produce poisonous chemical substances, and the cell which in the first instance was stimulated to increased growth by a small quantity of the poison, soon succumbs to the increasing amount and undergoes caseation. Some cells, or groups of cells, are, however, stronger than the others, and go on growing so as to form giant cells. These generally ultimately succumb, though in some instances they may get the

upper hand, and the bacilli may disappear. While this is going on, inflammation spreads around, and the process crosses from air-cell to air-cell. I believe also that this view of the production of a poisonous substance by the bacilli may explain the fever and wasting of phthisis." [13]

These observations are also confirmed by others. For instance, Veraguth,[14] as a result of his experiments on the inhalation of tuberculous sputum, notes that the first change to be seen is an increase in the number of tubercle bacilli in the alveolar epithelium, with consequent desquamation; then, later on, hyperæmia with migration of white blood-corpuscles into the alveoli, and a reactive increase in the neighborhood of the disease focus, which tries thus to keep off the bacillus by encapsuling itself.

Through the presence of the bacilli caseation takes place, the central portion of which dies. Only, on the periphery of the diseased focus, within epithelioid or giant cells, certain tubercle bacilli or spores are preserved, which later on enter the neighboring lymph-tracks, and set up fresh foci in the interstitial connective tissues and in the lymph-glands.

Baumgarten has even watched the development of epithelioid and giant cells,[15] and describes the so-called epithelioid cells as arising from the action of the tubercle bacilli on the fixed cells of the connective tissues, or on the epithelium. "Out of the epithelioid cells," he says, "the giant cells proceed. An increase of the nuclei takes place in them, while the partition of the cell body is omitted. This happens the more frequently the fewer there are of the tubercle bacilli, and the weaker their power of growth. If, however, an abundance of these bacilli are present, or their power of growth is increased, an irritation is caused in the walls of the vessels, and the white corpuscles migrate, and gradually supplant the epithelioid cells, thus taking the upper hand in building up the disease already commenced." [16]

Weigert [17] also confirms this story of the formation of the giant cells, by noting that there is a partial proliferation of the cell nucleus, while the body of the cell does not divide; then, in consequence of a partial caseation of the cells, the protoplasm is held together by the dead, and apparently degenerated, portions of the growth. Hence, the tubercle bacilli lie, not in the centre of the cell, but in the neighborhood of its

nucleus, because through the caseation of the protoplasm they go to the ground, but in the proliferating zone they can sustain and increase themselves.

It is thus plain that Dr. Williams' account of the relationship of the bacillus to the pathological changes in tubercle is fully borne out by these observers, and that a clear and intelligible histology of the disease has been worked out. In Ziegler's words, we must "regard tubercle as an inflammatory product, the result of an irritation, an infection;"[18] and, as we have seen, such constant association of the bacillus with the lesions of phthisis by no means excludes the possibility, often insisted on, of the secretion or production by its means of certain unorganized morbific material.

Dr. Watson Cheyne attributes much importance to this secretion, and Dr. Wilson[19] says: "The constitutional manifestations of tuberculosis are not directly due to the bacilli, but to toxic principles evolved during their growth and multiplication." He quotes Nencke's chemical analysis of tubercle bacilli, and his separation from them of a tetanizing poison; also Bonardi's demonstration in tuberculous sputum of certain organic bases which caused disturbance of the nervous system when introduced into rats and Guinea-pigs.

Dr. Coats, in his "Lectures to Practitioners" (p. 185), seems also inclined to infer that it is not the bacilli themselves, but their products, that are harmful. "They are minute vegetable bodies," he says, "which multiply along surfaces or channels, and do not usually penetrate into the living tissues. Such minute bodies cannot, by their merely physical properties, produce any serious damage. It must be rather that, in their growth, they evolve certain chemical principles which are injurious to the tissues." He adduces, in proof of his contention, the fact that, in tuberculosis of the peritoneum, you have the flat yellow caseous tubercles buried in new-formed connective tissue, which is fully organized, and contains blood-vessels; "it is the diluted products of the bacilli that induce the more simple inflammatory lesions." Pleuritic infection in phthisis he considers to be due to the same cause, and that a good deal of the inflammatory lesion in the connective tissue of the lung itself is of a similar nature.

These brief remarks may perhaps suffice as a statement of modern views respecting the pathological histology of tubercle.

It is also unnecessary, in the present instance, to recapitulate at length the characteristic points connected with the development and growth of the bacillus. They were so fully made out by Professor Koch himself that scarcely any addition has been made to our knowledge in this direction. For our present purpose, it will be sufficient to recall to our minds (1) the small range of temperature within which the organism can be successfully cultivated (between 84° and 107° Fahr.); (2) the length of time, from two to three weeks, required for its development; (3) its tenacity of life in sputum, Fischer and Schill having found it virulent after 43 days in putrefying sputum, and 186 days in sputum dried at ordinary temperatures; (4) the observation showing the antagonism that exists between the living elements, especially the wandering cells, the leucocytes of the body, and the bacillus—observations tending to show that, as a rule, the organism has a short life within the body, and that it can only maintain its presence, for any length of time, by the appearance of new generations to fill the places of the dying.[20]

The histology of tubercle being thus clear, the reason for its spreading infectively through the system has also been made plain. It hardly needed Koch's demonstration of the bacillus, to show the track by which it usually makes its way. A close relationship between the lymphatic system and tubercle had already been clearly shown by many observers, such as Virchow, Wedl, Rindfleisch, Wagner, Aufrecht, Buhl, Burdon-Sanderson, and Treves.

Thus Rindfleisch[21] pointed out that "specific irritation of the endothelia of the lymphatics, the serous membranes, and the blood-vessels, is the essential factor in the production of the miliary nodule, and it is only because the lymphatics run by preference in the immediate neighborhood, in the adventitia of the blood-vessels, that miliary tubercles exhibit a preference for that locality."

Aufrecht regarded miliary tubercle as "a granular perilymphangitis."

Wagner speaks of "the extension of tubercle . . . in the course of lymphatic vessels, or in that of blood-vessels."

Treves looks upon tubercle as infective, and affirms that "lymphatic structures of some kind are essential" to its formation.

Buhl [22] goes still further and says: "Tubercle extends from the internal wall of the alveoli into the textureless lymphatic vessels."

These ante-bacillary observations are only confirmed by the researches of Koch, and by such men as Baumgarten, Fischer, Volkmann, and others.

Also the mode in which the bacillus gains access to the system was noted long before Koch's time. It was recognized that the points of attack selected by the disease indicated that the infection comes from without the body. Thus Cohnheim, in his work "Die Tuberculose vom Standpunkt der Infectionslehre" (p. 20), shows that a tuberculous or scrofulous product is mostly deposited in those parts of the body that are either most exposed to attack from without, or in which any virus coming from the outside may lodge for the longest time. Thus no internal organs are so constantly brought into relation with the atmosphere as the lungs, and accordingly no other organ is attacked by tubercle with the same frequency and the same intensity.

In many cases of this disease also all the other organs, not connected with the lungs, are free from its attack.

Such a fact as this could not well be accounted for on any other supposition than that of a primary and immediate attack upon the respiratory tract by the virus. Next in order to the lungs and pleuræ, and to the bronchial and tracheal glands, come the glands about the pharynx; and then, next after these, owing probably to the swallowing of sputa, we find the lymphatic apparatus of the walls of the intestines, the isolated and agminated follicles, most liable to be the seat of tuberculous ulceration. The œsophagus escapes contagion because of the rapidity of the transit of the virus, and the stomach, perhaps, owing to the presence of the gastric juice. Through the intestinal ulcers a path is opened to the mesenteric glands, the liver, and the whole of the rest of the body, thereby producing general tuberculosis.

The demonstration by Koch of an organism that must in most cases come from the air, and that could in this way penetrate the lungs, or enter the lymphatics by sores, only served to make assurance doubly sure. The vehicles of the virus were indicated. Tubercular bacilli were found by Koch in dried and powdered sputum, by Cornil in the walls of rooms,

by Dr. C. T. Williams in the air brought by ventilating-shafts from a ward in Brompton Hospital, and by myself, though rarely, in the aqueous vapor condensed from the breath of patients in an advanced stage of consumption, and this latter observation was confirmed by Dr. C. Smith by means of gun-cotton respirators. (Some doubt has been cast upon the possibility of bacilli being found in the breath, especially by Dr. Cornet ("Berliner Mediz. Woch.," 25 März, 1889, p. 250). He adduces as grounds for disbelief the considerations, 1, that non-volatile substances could not be exhaled; 2, that many competent observers have failed to find them; 3, that errors may have crept into the observations. To these objections I would reply: 1. That any one who will examine microscopically the condensed aqueous vapor of the breath may soon convince himself that it contains much non-diffusible organic matter, such as epithelial scales, etc. (see paper on "The Organic Matter of the Breath," "Jour. of Anat. and Phys.," IV., 209). 2. To the observations named by Dr. Cornet must be added those of Dr. G. Heron, who informs me that he also was unable to find bacilli in tubes and watch-glasses exposed for long periods to the breath of phthisical patients. But there is nothing surprising in the fact that such negative results have been obtained. I found no bacilli, in some cases, in the deposit from several drachms of condensed aqueous vapor, and very few in any case. 3. The fact that the bacilli were so few in number is of itself a tolerably sure proof that no contamination by sputum had taken place, owing to the precautions taken to prevent this accident.) The point of usual entrance of the organism was also demonstrated.

Professor Klein followed the development of tubercle from the "epithelial cells of the alveoli," and, as we have seen, Dr. Watson Cheyne confirmed these observations by finding that the principal seat of the specific bacillus in the lungs is the alveolar epithelium, and its products—*i.e.*, in the epithelioid cell and the giant cell.

Another important result of Koch's discovery is that in placing tuberculosis undoubtedly among the class of microbic diseases, it imposes upon us the task of determining its affinities and assigning to it its place among other such disorders.

It was suspected long ago that tubercle bore a close relationship to some of the infective class of diseases.

Without laying any stress upon the ancient guess that consumption is due "to animalcules in the lungs,"[23] it was proved by Villemin in 1865 that tuberculous material would convey the disease to sound animals, when it was introduced into their bodies by puncture or inoculation, and his results were shortly afterward confirmed by others. Moreover, animals fed with this material contracted the complaint, and the inhalation of dried and pulverized sputum from consumptive patients caused the disease in dogs and other animals.

Many observers were also on the look-out for specific organisms, notably Chauveau, Baumgarten, Ziegler, and Zinn. Ziegler[24] plainly tells us to regard tubercle as "an inflammatory product, the result of an irritation, an infection," and he does not doubt that "schizomycetes play an important part in phthisis."

Some, as Klebs and Deutschmann, thought they had actually found a "monas tuberculosis;" Toussaint a "coccus;" Buhl and Aufrecht, "a specific bacterium."

Finally Koch's researches settled the question, and the tubercle bacillus reigns supreme as the essential specific element in the causation of phthisis and other tubercular diseases.

But even before the specific cause was established, the relationship of tubercle with other infective disorders had been suspected.

Both Villemin and Virchow compared tubercle to the granulations of glanders, and the gummata of syphilis; and though the former separated scrofula from tubercle, he points out that they both share with syphilis, glanders, and typhoid fever, the character of forming caseous material. Klebs and Cohnheim also pointed out the similarity existing between tubercle, glanders, syphilis, lupus, pearl disease in cattle, and even lepra, and they regard them as closely allied in all essential points of their anatomical structure and history.

In his Gulstonian Lectures on Tubercle, Dr. Southey also showed that typhoid lymphomata are very like tubercle, both in their composition and their course, affecting similar parts and leading to like lesions. He places tubercle between cancer and these and other lymphomata.

Dr. Southey goes so far as to suggest that tubercle in its acute form may even become epidemic, and he cites, as in-

stances, of this form, some cases recorded by Dr. Léon Colin in his paper on "Tuberculization Aiguë. This view is, however, scarcely supported by the facts. I have read this paper, and find that his cases are mostly those of young soldiers who had recently joined their regiments, and M. Colin himself especially points out that they may all have been the subjects of chronic phthisis before they came out, and the change from a temperate northern climate to a Mediterranean station had produced a sudden outbreak of acute disease. He does not suggest that it was a true epidemic, and he adduces the English army statistics as bearing witness to the danger of transferring men of northern climates to hot climates. The likeness to an epidemic is thus reduced to an accidental lighting up of the disease in an acute form by the influence of a hot climate.

Tubercle, then, can only be said to be allied to ordinary epidemic diseases in the sense that they are all parasitic disorders.

It may rather be regarded, like leprosy, as a type of an endemic disease. Dr. Guy, in his work on "Public Health" (p. 42), when defining epidemic maladies, expressly singles out consumption as a "non-contagious, domestic disease," and, to point his remark, he refers to the very slight fluctuations in its rate of mortality, and says: "If, then, any one were to assert that this disease is contagious, which is tantamount to saying that it may be epidemic, the figures I have quoted would in themselves furnish an answer in the negative."

It by no means follows, however, that a disease need be contagious or epidemic because it is derived from without the body, and because it afterward travels infectiously along the channels of absorption, or of circulation. Although infective, it need not be infectious, and may be incapable of being conveyed directly from the body of one patient to that of another. The discussion of this question as regards phthisis must be postponed until later, but it may be sufficient for the present to point to intermittent fever, as an instance of a disease which, though non-contagious, is essentially infective and connected with a microbic parasite.

Whether contagious or not, phthisis is sharply marked off from ordinary exanthematous disorders, not only by its specific micro-organism and by its endemic habit, but also by its usually slow and creeping and irregular course, and by the

permanent growths and alteration of structures and destruction of tissue that are brought about by the bacillus.

The exanthemata, on the other hand, are acute in their type, they run a rapid course and have certain definite and fixed periods of incubation, of inflorescence, and decline. They seldom attack the same person twice, though they are highly infectious for the most part, and after visiting a people for a time, they depart almost completely, until, in fact, a sufficient density of susceptible persons has grown up to permit them to regain their epidemic character. Lastly, they seldom leave behind them permanent growths which tend to spread destructively through the tissues.

We can thus mark off, as alien to tubercle, a large group of microbic diseases, even including those already mentioned as leaving lesions somewhat similar in character to tuberculosis, such as enteric fever and acute glanders.

In searching for the diseases kindred to tubercle we must look for those which are chronic, endemic, irregular in their course, and produced by the action of a micro-organism which is of comparatively feeble power of irritation, but which nevertheless brings about inflammatory action, tending to produce permanent changes and necrosis of the tissues, and travelling along the track of the lymphatics or in the currents of the blood.

Chronic glanders, or farcy, includes most of these points of resemblance. It is produced by a bacillus discovered by Drs. Löffler and Schütz, which has been best cultivated in blood-serum and isolated, and which produced the specific disease by inoculation into horses, Guinea-pigs, rabbits, and field mice. The farcy buds and nodules caused by its presence are found not only in the nostrils, but also in the larynx, trachea, and lungs, and they closely resemble tuberculosis in their appearance and in their structure. It has also been known to attack the nervous system. Like scrofula, it produces intractable ulcers of the skin and mucous membrane and affections of the joints. In some cases the chief symptoms are cough, with sanguineous expectoration, hoarseness, fever, and emaciation, so that it may well be mistaken for phthisis.

It is a contagious malady, but it has been found to be subject to predisposition, and susceptibility to it is enhanced by unhealthy conditions of life, impure, re-breathed air, cold and damp being especial factors in the result.

A close affinity to tuberculosis may also be traced in such diseases as actinomycosis, frambœsia or yaws, and in the fungus disease of India, or Madura-foot.

The origin of two of these disorders is, however, too obscure to allow us to catalogue them in due order. It is even doubtful whether the fungus found in the dark variety of mycetoma is essential or adventitious, and frambœsia is more acute in its course than most forms of tubercle.

Actinomycosis, however, presents many features in common with tubercular disease. It is characterized by the formation of nodules, somewhat resembling tubercular growths, and showing, perhaps, some relationship in their mode of production.

In the centre of these nodules are the specific club-shaped corpuscles, the actinomyces. As the nodule grows, a zone forms around it of large, nucleated cells, not unlike giant cells in appearance. These are surrounded by exudation-corpuscles, and these again by a capsule of fibrous tissue. These inflammatory nodules ultimately coalesce, and gradually form large tumors, but while still scattered and small in the lungs they much resemble tubercles. There is also in actinomycosis a greater tendency to suppuration.

Cohnheim remarks (p. 743): "We find in actinomycosis all the essential criteria which are characteristic of the infective tumors."

Actinomycosis also would seem to preserve a somewhat endemic character. It has been observed by Claus that in Bavaria the cattle affected by it were chiefly confined to three districts.

At present, however, it is chiefly an epizootic disease, affecting cattle rather than mankind, and, moreover, the organism causing these lesions belongs to an order distinct from the bacillus of tubercle. Technically, it is allied to the hyphomycetes, similar to aspergillus, or the pébrine of silkworms, the saprolegnia which causes salmon-disease, the oïdium of vines, and of favus, ring-worm, and thrush. In spite of its infective character, therefore, and of the somewhat similar nature of its course and the injuries it inflicts, it cannot be placed in the same order as tuberculosis.

But it must be acknowledged that the closest resemblances are to be found between tubercle, syphilis, and leprosy. (Per-

haps at some future time, when the microbe of cancer has been made out, this disease may be added to the group.)

All these disorders are of microbic origin, they are capable of varying degrees of intensity, and possess the power of renewing their ravages after varying periods of dormancy; they produce growths that are strikingly similar in pathological characters, and they either are or have been universal in their distribution apart from considerations of climate, race, and habits of life.

Syphilis, it must be admitted, is, in certain points, more like an exanthematous disease than it is like tuberculosis; thus, it is highly contagious, and is not very discriminating in its victims. It does not usually recur, it has a fairly definite period, and has a number of distinctive rashes, and in its initial stages is usually acute in its manifestations.

Nevertheless, if we can trust the researches on this point, a matter still very doubtful, it appears to be due to a bacillus, which is capable of cultivation, and which takes a special kind of stain, and this organism apparently possesses the power of remaining latent for long periods of time. It is said to have been found in all the lesions of syphilis, and these lesions, as in tubercle, are apparently due to the slow irritative action of the organism, though they are constantly more vascular in character than true tubercle. The most prominent feature of these lesions is the collection around the vessels of round cells (? leucocytes), but in the more chronic products of the disease, epithelioid and giant cells are found. The essential part of their distinctive action appears to be due to an infiltration of the tissue, and the subsequent necrosis of the part, just as we have found it to be in tuberculosis.

When the mass of inflammatory tissue is considerable, it forms tumors which, in their earlier stages, are with difficulty distinguished from tubercles. These gummata, however, differ from tubercles in being composed chiefly of translucent, gelatinous material, which, in caseating, as it does later on, becomes tough and fibrous. They have also less tendency to soften than tubercle, though they may cause destruction of surrounding tissues by ulceration, leaving a mass of scar-tissue as their ultimate result.

Their most common distribution also throughout the body differs somewhat from that of tubercle, though when they at-

tack the lungs the diagnosis from phthisis becomes very difficult. The virus takes its course along the same channels, which is mostly along the track of the lymphatic vessels.

But of all these disorders, unquestionably the nearest approach to tubercle is to be found in leprosy. In their pathology, in their course and distribution, and in many other features these diseases show the closest relationship.

Perhaps I may be permitted to trace the resemblance somewhat in detail. It is probable that in certain points light may be reflected upon the character of the allied disease, and even if it should prove to be impossible to apply to tubercle the lessons taught by the disappearance of leprosy from the central parts of Europe, we shall at least be in a stronger position when we come to treat upon the preventibility of tubercle.

1. A micro-organism is closely associated with each disease, and the bacillus of leprosy is so similar in appearance, and in its reception of staining fluids, that the most accomplished bacteriologists can find little or no difference in appearance between it and the bacillus of tubercle.

It has indeed been said that the bacillus lepræ receives the stain rather more readily, but even this statement does not always hold good, and it has been proved that the human tubercle bacillus is longer in being colored than the artificial cultures of this same organism; and Baumgarten comes to the conclusion that, both in their morphology and their staining, they cannot be distinguished. He grants, however, that they produce decidedly different nosological results. (Koch points out, that "although the bacillus of leprosy can be stained by the same method as the tubercle bacillus, the contrary does not hold good. The former, as Neisser has shown, stains by Weigert's plan for coloring nuclei, but not the latter. So that, although the two kinds of bacilli resemble each other in form, size, etc., it is always possible to distinguish them by trying Weigert's color-reaction."—Syd. Soc., I., 85.)

The bacilli of lepra are also found in much larger proportion in the diseased tissues, than those of tubercle. Moreover, hitherto it has not been found possible to produce the disease by inoculations with the organism, although tissue-implantation has recently been successfully performed. Pure cultivations of lepra bacillus cannot be obtained. Evidently, while

there is a strong likeness between them, we can hardly agree with Dr. Daniellsen, who boldly says: "On ne peut indiquer un signe certain qui permette de différencier le bacille lépreux du bacille tuberculeux."[25]

2. Leprosy is like tubercle in its mode of attack. The entrance of the virus takes place at the most exposed portions of the body. As in phthisis the atmosphere conveys the bacillus to the air-passages, and in scrofulous glands to the nearest sore; so in leprosy, contagion takes place first on exposed parts—the bare hands and face—and in countries where the feet are uncovered these are the first to receive injury. The unshod Japanese are especially liable to the disease.

Some previous injury is also necessary: the epidermal covering forms a varnish impenetrable by the parasite.[26]

3. After its entrance into the body, leprosy is usually very slow in its progress, creeping infectively through the body, often with long intervals of latency, in this respect also resembling tubercle. The main point of difference is the greater chronicity of leprosy, which lasts on the average ten or twelve years, instead of three or four, as in the case of phthisis. Both diseases tend toward a fatal issue, but both are capable of becoming absolutely quiescent and inert for long periods.

4. The pathology of the two diseases is also strikingly similar. Although the bacillus in leprosy chiefly affects the skin and mucous membranes, the nerves and the bones, in its tubercular forms the structure of the leprous "knots" gives ample evidence that they are formed in the same way as tubercle, by the slow irritation of the bacillus. Baumgarten points out that the large, so-called "lepra cells" arise through the increase of the fixed tissue cells, while the lymphoid elements of the leprous growth are migrated, colorless blood-corpuscles.[27]

It is interesting to note, with reference to the site of leprosy, that it attacks internal as well as external organs, and that it has even been found in the lungs. On the other hand, tubercle bacilli have recently been found in the nervous system.

5. Both are distinctly endemic diseases, and they are, or have been, found in almost every country where human beings are collected together in any number.

They are equally uninfluenced by climate and temperature. As phthisis is now, so leprosy was formerly, endemic, not only in Asia and Africa—where, perhaps, it originated—

THE LEPRA HOSPITALS.
OF THE
BRITISH ISLES.
DURING THE MIDDLE AGES.
Prepared by Dr. J. Draschfeld
Professor of Pathology
in the Owens College Manchester

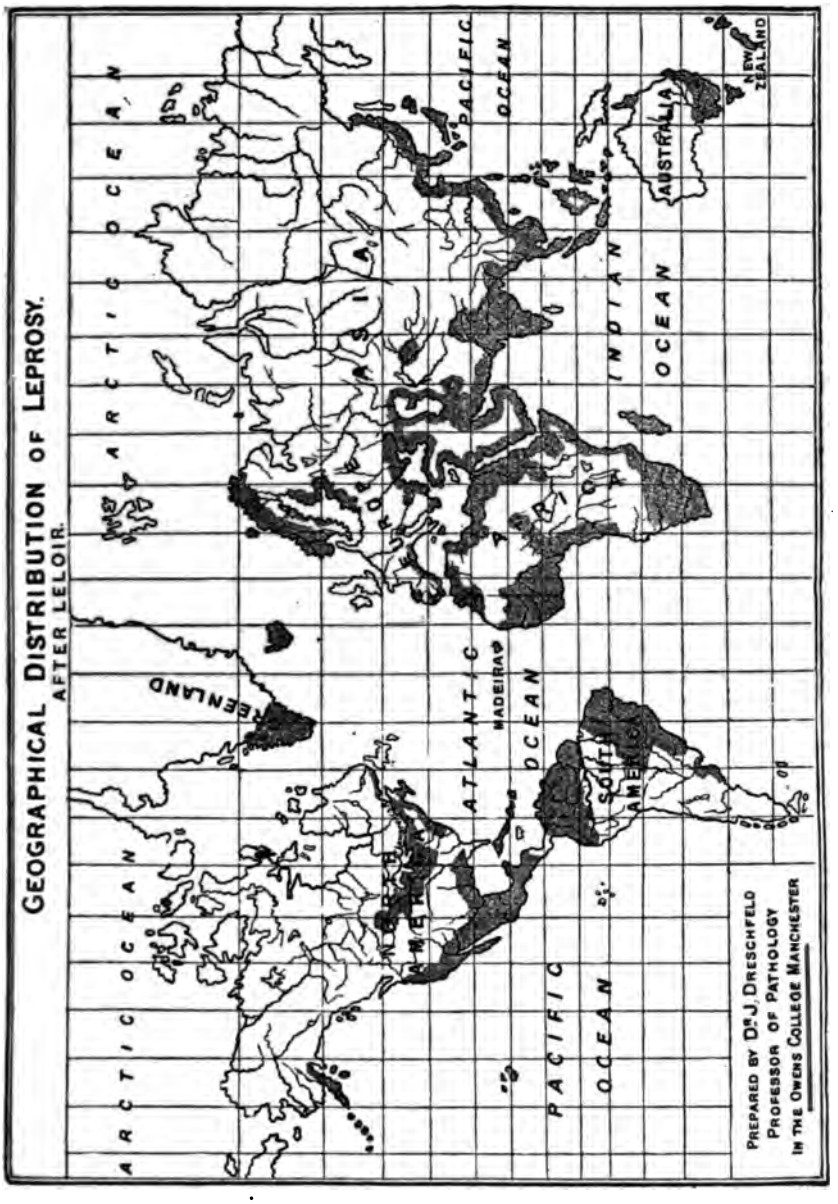
but also throughout Europe. (Raymond, in his "Histoire de l'Eléphantiase" [Lausanne, 1767, p. 106], proves that the disease existed in Lombardy in the year 603; and there is evidence that leper-houses were founded in the eighth century in France, England, Germany, and Italy. A little later Matthew Paris computed that there were 19,000 of these asylums throughout Christendom, and it is well known that in the reign of Louis VIII. of France there were 2,000 of these institutions in that country alone, which were endowed by his will. The religious orders of the Knights Hospitallers, and especially those of Saint Lazarus, were founded mainly for the care of lepers, and their chief was usually himself affected with the disease.)

I have here a map, kindly lent to me by Dr. Dreschfeld, showing the distribution of lazar-houses throughout the British Isles in the middle ages. It will be seen that they are very numerous, and so spread out through the length and breadth of the land, as to indicate a very wide prevalence of the disease.

It is probable also that many have been omitted. Thus Newcastle-upon-Tyne is not marked, and yet I have learned from Mr. Marsden Gibson, the master of the Hospital of S. Mary Magdalene, that it was originally founded for the benefit of lepers—and, perhaps, the Hospital of St. Thomas the Martyr also. The funds of many of these places have been, for the most part, diverted to other purposes. (Since this chapter was written, Dr. Dreschfeld has received several communications from medical men indicating other sites of leper hospitals, and these have now been added to the map.)

Even at the present time its presence is sufficiently manifest in the four quarters of the globe to show that it is independent of climate.

It will be seen from the map of the word that has been drawn by my friend Dr. Dreschfeld, who has kindly lent it to me, that, in Europe, it exists in somewhat large proportions in Norway, and on the Rusian coasts of the Baltic and the Gulf of Finland, and on the shores of the Black Sea. It is abundant in Roumania and parts of Turkey and Greece, in the north of Italy and on the Riviera; in Sicily and on the coasts of Spain and Portugal. Iceland is also deeply stained with the disease taint. In Africa, it will be seen to exist around


GEOGRAPHICAL DISTRIBUTION OF LEPROSY.
AFTER LELOIR.
ARCTIC OCEAN
ARCTIC OCEAN
GREENLAND
ICELAND
NORWAY
SWEDEN
RUSSIA
NORTH AMERICA
ATLANTIC OCEAN
MADEIRA
PACIFIC OCEAN
PACIFIC OCEAN
SOUTH AMERICA
INDIAN OCEAN
AUSTRALIA
NEW ZEALAND
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almost the whole of its vast coast. It is widely spread in Morocco, Tunis, Tripoli, Egypt, and Abyssinia; at the Cape and in Madagascar, and Upper and Lower Guinea.

In America, it exists in Greenland, Quebec, and in many of the northern and most southerly States, Alabama, New Orleans, and Texas. It is widely spread in Mexico and California. In South America, the northern and eastern portions are widely stained as far south as Monte Video.

In Asia, Arabia, Persia, Turkistan, and the coasts of China, Siam, and Japan are all more or less tinctured with it; but India is its great hotbed. In Australia, Queensland on the north, and New South Wales and Victoria in the south, are affected by it, and both Tasmania and New Zealand are darkly tinted.

It seems to have a special predilection for islands; thus, in addition to those I have already mentioned, the Grecian Archipelago is especially subject to it: Crete, Tenedos, Patmos, and Rhodes; Samos worst of all. It is found also in Cyprus. In Asia, the Philippines, the Moluccas, the Celebes, the Caroline Islands, the Mariannes, Andamans, and Nicobars, the isles of the South—Borneo, Sumatra, and Java; off America the Antilles, the West Indian islands; off Africa, Madeira, the Canaries, the Cape de Verde islands, Socotra, the Isle of France, the Seychelles, St. Helena; and Robbin Island, off the Cape of Good Hope, is made into a leper sanatorium.

In the Pacific, we have only too recently heard of its ravages in Hawaii, and it exists, though less abundantly, in Tahiti, Fiji, and New Caledonia, where it seems to have been recently introduced.

It is obvious, from this long list of habitats of the disease in the past and present, that, like phthisis, it is independent of climate, and though certain races are more prone to it than others, none are entirely exempt. It is also more common among the poor and filthy than among the rich and cleanly; but it is not confined to this class, and appears among the well-fed as well as among those who are confined to vegetable diet, and those who feed upon fish.

6. Precisely the same controversy as is now waged with regard to phthisis, is carried on as to the contagiousness of leprosy. In early times and the middle ages, in all countries, no doubt at all was entertained upon the point. In all Eastern

countries, the leper was "unclean," his clothing and dwelling were equally regarded as contaminated, and in Europe all kinds of devices were adopted to avoid contagion. (He wore a distinguishing costume, and carried a bell or clapper with which to warn those he met. He had a separate "borde" or hut, or slept under a hedge; he might not even look into any well or fountain, or drink from any stream but his own; must keep to the leeward of any one whom he might meet or speak to. He had to wear gloves when he passed over a bridge, and could go nowhere without a special license ("Curiosities of Leperdom," "Cornhill Magazine," August, 1889, p. 143, quoted from Grosley's "History of Troyes"). In the fourteenth century, they were supposed to be associated with the Jews, in a horrible plot to poison all the springs, wells, and rivers with their blood; and in 1321 a fearful masacre of them took place in France. At Chinon 160 were burnt in one day, and in Périgord and Languedoc, in a plague panic, fires were lighted everywhere, and lepers and Jews heaped thereon.)

This belief in the contagious nature of leprosy still remains in many countries, and lepers are carefully isolated in Norway, though without excessive rigor.

But the greatest differences of opinion prevail on this question among medical men.

In the report of our own College in 1860, the commission state decidedly, "that the weight and value of the evidence they furnish is very greatly in favor of the non-contagiousness of leprosy" (p. vii.), and again, "the all but unanimous conviction of the most experienced observers, in different parts of the world, is quite opposed to the belief that leprosy is contagious or communicable by proximity, or contact with the diseased." Just as we shall see presently, in the case of phthisis, they quote the experience of hospitals, and the immunity of the attendants in leper asylums.

In the discussions on this question at the International Congress at Copenhagen in 1884, the two chief exponents of the disease, Dr. Zambuco of Constantinople, and Dr. Hansen of Christiania, took entirely opposite views; the former maintaining that leprosy is not contagious, but is hereditary, and the latter, that it is contagious and not hereditary. Dr. Daniellsen, the father of research on the subject, also takes the non-contagious view, and says: "According to my observa-

tion, heredity is sufficiently proved, while I have not found one single well-proved case of infection."[28]

7. A similar difference of opinion is to be found as to the influence of heredity in both diseases. With regard to leprosy, Dr. Hansen states that of 160 Norwegian lepers, who had settled in the States of Wisconsin, Minnesota, and Dakota, none of the offspring, in some cases as far as the great-great-grandchildren, have shown signs of the disease. He points out that there could have been no question of heredity in the case of the great outbreak of the disease in Hawaii.

A recent writer on the subject, Dr. Albert Neisser, also considers that leprosy is not a hereditary disease, though he acknowledges that the susceptibility of the individual appears to be of more importance than in any other bacterial disease.

It is not surprising that, with all these points of similarity, the question should be asked, as it is by Daniellsen, whether "leprosy itself is not a tuberculous disease."

"The circumstance that the bacilli of tubercle are larger and less disseminated in the tissues," he says, "ought not to be invoked as a sufficient diagnostic characteristic. Nor can we draw any more conclusive argument from the mode of development of these bacteria."

"The manner in which infection in leprosy takes place, the long and silent period of incubation which characterizes it, recalls in the highest degree the infection of tubercle."[29]

Dr. Daniellsen further affirms that tubercular disease is more common among lepers than among the general population; but, even if this were true, the fact might fairly be ascribed to the general low state of health of lepers making them more vulnerable to the attacks of the tubercle bacillus.

This statement is, however, contradicted by Dr. A. Hansen, who, as I am informed by Dr. Stabell, of Bergen (in answer to a question of mine), states that "tuberculosis, which was formerly very prevalent in the leper hospitals of Norway, (and no doubt the patients were infected in the hospitals), is now more seldom seen, because the hospitals are now not so crowded as before. Tuberculosis, indeed, attacks lepers as it does other people, but the acute form is not more frequently seen among phthisical lepers than among other persons affected with phthisis."

On many grounds, therefore, the doctrine of identity must be dismissed. The different behavior of the two kinds of bacillus in the presence of cultivating media, their selection of certain tissues as their chief haunts, the difference in their rate of progress, and the fact that there is no special tendency toward tubercular disease among lepers, and *vice versâ*—all these considerations show that, though they are certainly closely related, yet there is no identity to be discovered between them.

At this stage it may be useful to draw certain practical conclusions from this review of the pathology and affinities of tubercle; they may assist us when we come to deal with the question of its preventibility:

1. That the bacillus which provokes the disease comes most frequently from outside the body, and is conveyed by means of the atmosphere.

2. That it requires a certain length of time, and certain narrow limits of temperature within which it can develop.

3. That when it is entrenched within its encapsulating tubercle it is placed at a distance both from the currents of blood in the vessels, and from air entering through the lungs.

4. That its life in the body is usually a short one, and that the living tissues are antagonistic to it, or, to use Dr. Moxon's words, that "the life of the bacillar parasite is difficult, easily discouraged by unfavorable circumstances, like an aphis by an easterly wind;" and

5. That the resemblance which it bears to the bacillus of leprosy may encourage us to hope that, as this latter disease has been banished from our country, so also may the different forms of tuberculosis ultimately disappear.

CHAPTER II.

THE TOPOGRAPHY AND DISTRIBUTION OF PHTHISIS.

It is not unreasonable to expect that a study of the geographical distribution of phthisis would lead us to the discovery of at least some of the predisposing causes of the disease.

In the different countries of the world the racial differences of the inhabitants are often very great, and the conditions under which they live, as to climate, food, habits, etc., are so varied that we might reasonably expect to find some nations suffering [illegible] and hope we might be able to lay our finger upon the circumstances that have been either [illegible]

[illegible] entirely discredited by the [illegible] thorough examination of statistics appear to be necessary.

[illegible] information, as to the comparative [illegible] the two great general works, [illegible] Historical Pathology," and Lombe [illegible] but we are able to obtain [illegible] and Army and Navy Medical Reports [illegible] of disease in different countries, [illegible] individual medical men.

[illegible] figures are not very satisfactory, [illegible] method of comparing the number [illegible] each 1,000 of the total deaths, a [illegible] from consumption the higher [illegible] thus a place with double the rate [illegible] is compared with another with [illegible] in the same grade with it, if [illegible] also twice as great as that of the

[illegible] are also open to objection: [illegible] as we propose to make, it may, [illegible] of somewhat imperfect

Hirsch's tables are the most trustworthy, as he gives the mortality from phthisis per 1,000 living, and the years to which the returns apply, together with his sources of information, which are always the best that can be obtained. I have thrown his principal figures into the form of a diagram, which exhibits graphically the variations in the complaint better even than the figures themselves.

I have also a table drawn from Dr. Lombard's work, which shows the proportionate mortality in the capitals of the world.

TABLE II.—*Proportion of Deaths from Consumption to 1,000 Deaths at*

London	121	Rome	114
Paris	143	Milan	132
Brussels	163	Lisbon	115
Vienna	208	Athens	183
Berlin	109	New York	167
Stockholm	160	Rio de Janeiro	186
Christiania	172	Lima	171
St. Petersburg	151		

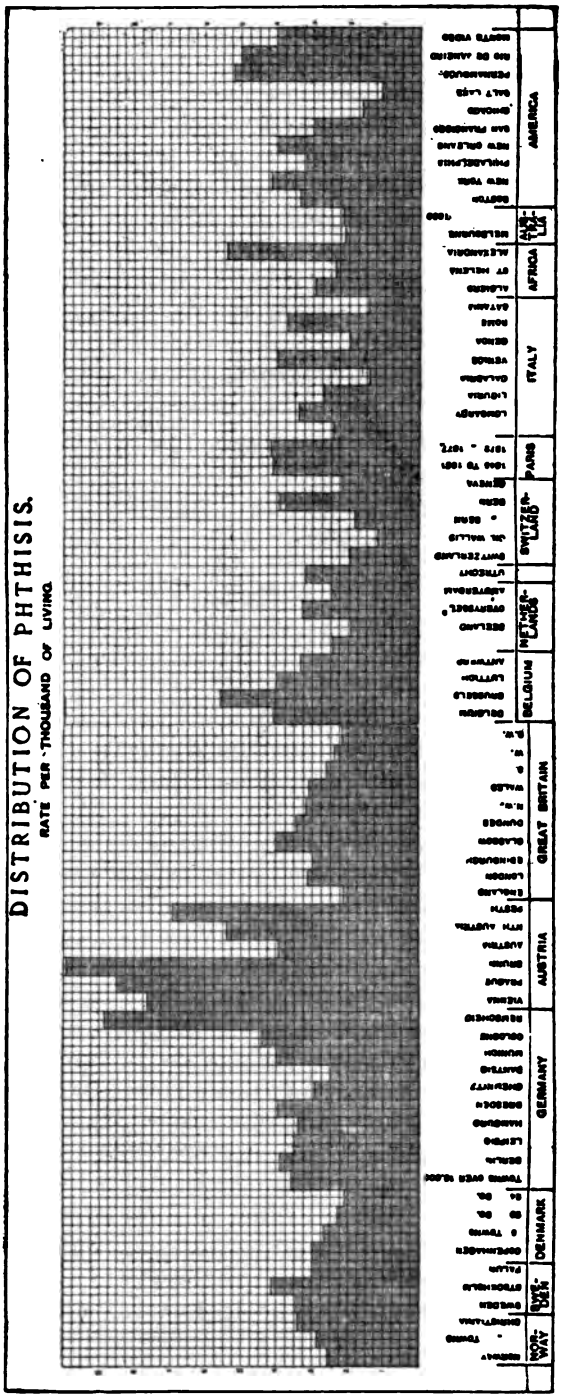
Lombard.

At the first glance at the figures placed at our disposal from these various sources, it would seem as if the expectations with which we commenced our quest were doomed to disappointment.

The disease appears upon the death-roll of almost every nation; it is everywhere present in greater or less abundance; and even if some countries appear to suffer less than others, certain places within their boundaries are to be found in which the disease exists in more than average proportion.

As both Hirsch and Lombard remark, "Phthisis is a ubiquitous malady." If we look at the map of the world which the latter provides, in which various degrees of shading are made to denote the presence of the malady in greater or less abundance, it would appear that he is quite justified in his assertion. In all climates, in the north, and in the south, east and west, however various the conditions under which men live, however much they may differ in race, in diet and clothing, and in habits of life, wherever human beings are congregated together, there phthisis is to be found.

With very few exceptions, the degrees of shading denoting


DISTRIBUTION OF PHTHISIS.
RATE PER THOUSAND OF LIVING
NORWAY
SWEDEN
DENMARK
GERMANY
AUSTRIA
GREAT BRITAIN
BELGIUM
NETHERLANDS
SWITZERLAND
PARIS
ITALY
AFRICA
ASIA
AMERICA

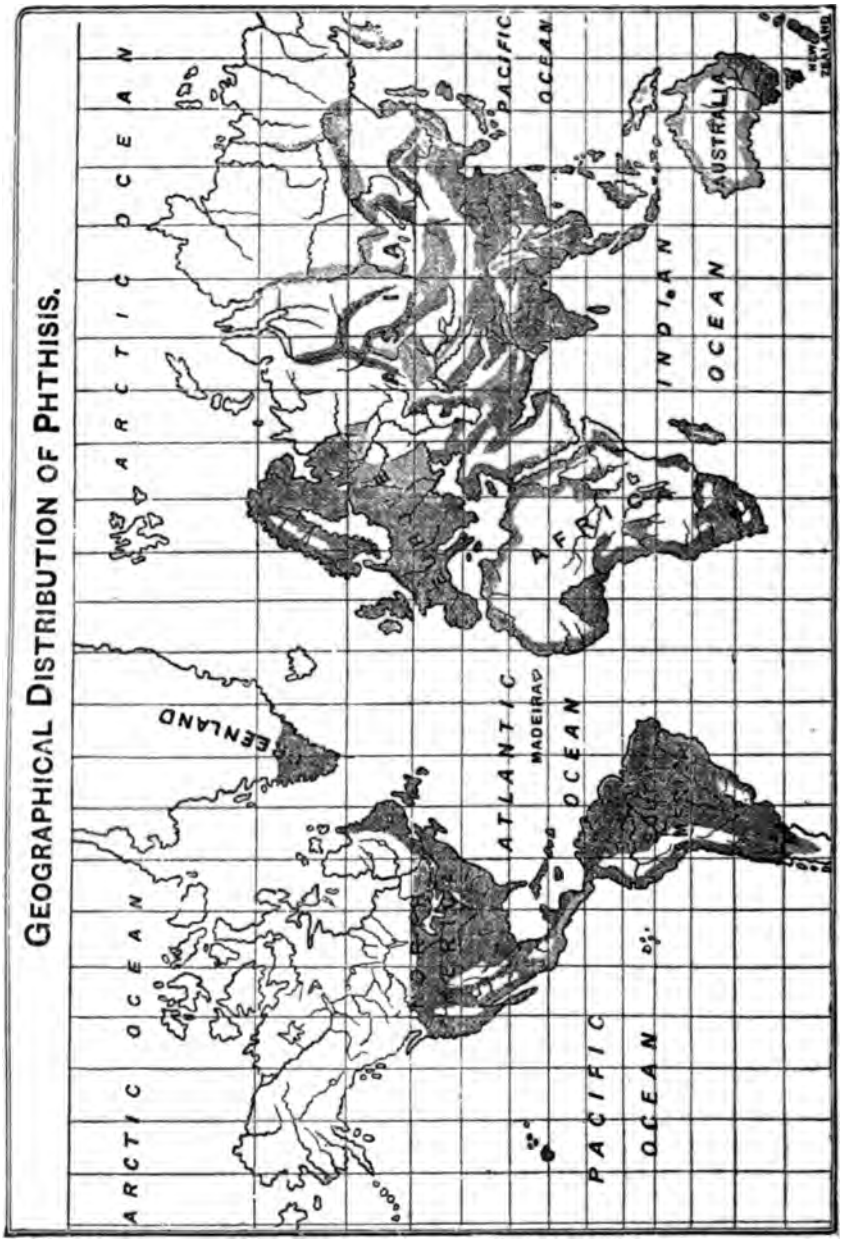
variations of prevalence serve also to denote variations in the relative density of the population in different parts of the globe. In other words, in proportion to the number of the people aggregated together upon a given space of ground, so also is the rate of mortality from phthisis.

In Dr. Lombard's maps, the only portions of the earth's surface from which the color is entirely absent, are the arctic and sub-arctic regions, deserts, and high ranges of mountains, and it is precisely in those parts that human beings are fewest and most sparsely scattered over the ground.

In all the capitals of countries, and in the chief cities of Europe, Asia, Africa, and America, there is but little difference in the phthisis rate, and what differences there are are not to be accounted for by differences in climate. See Table II.

We are impelled to similar conclusions by a survey of the army and navy returns from all parts of the world.

We might then hastily conclude that but little of any value can be obtained from such a research as this, except that the very universality of the disease connects it with the collection together of human beings. And such a conclusion might, perhaps, have been reached by *a priori* reasoning. In the light of our present knowledge of the essential cause of phthisis, there is nothing surprising in our thus finding the disease wherever human beings are gathered together. So far as we know, the chief source of the organism that provokes the malady is the human race, and hence, unless there are adverse conditions, it might be expected to follow mankind in its distribution over the surface of the globe. Without further investigation then, it would appear as if the organism could exist under all conditions under which human beings could also live, and as if our search for secondary causes would lead to no definite or certain result. But this view would certainly be an erroneous one. It is already something to have ascertained that the disease may exist everywhere, under every sky, in country or in town, in all classes of society, in the palace and in the hovel, among the luxurious and well-fed, as well as among the poor and starving, but much more than this can be deduced from the statistics at our disposal. If we break up the figures presented to us into smaller groups—in other words, if we try to analyze the returns of the disease—we shall find out that it has its predilections; and by observing


GEOGRAPHICAL DISTRIBUTION OF PHTHISIS.
ARCTIC OCEAN
ARCTIC OCEAN
GREENLAND
NORTH AMERICA
ATLANTIC OCEAN
MADEIRAS
PACIFIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
AUSTRALIA
NEW ZEALAND

more narrowly its selection of favorite habitats and breeding-grounds, we shall obtain important indications that will guide us to a discovery of the conditions that determine its choice.

1. We have already some reason, in the almost universal presence of the malady, to conclude that the ancient doctrine of its origin in a damp, changeable climate is erroneous. It has been called "la maladie Anglaise," from its supposed excessive prevalence in this country; but we have already seen that it prevails to a still greater extent in the dry, sunny atmosphere of Egypt, as at Alexandria; and in the hot climate of South America, as at Pernambuco and Rio de Janeiro; but we may take another method of proving its independence of climate.

Let us take the extreme variations in the disease, in places geographically close together. We shall find that they are so great, and so frequent in different countries, that they could not have been due merely to differences of climate.

If we take the map of almost any country in the world and shade its several provinces so as to denote the varying prevalence of the disease, we shall discover not only that a great variety of tint has to be used, but also that the dark parts alternate with the light, without any reference to geographical position, north or south, east or west.

Thus, in Dr. Haviland's map of the distribution of phthisis in England and Wales, we find that dark blue and dark red spots, the antitheses of prevalence, are interspersed all over the map.

The same observation is true of Boudin's maps of France, showing the prevalence of chest-disease and scrofula. I have here also a map of Norway, displaying the same alternations of light and dark in all parts of the country.

But we may come to closer quarters still, and may take the variations within the areas of counties instead of countries; for instance, within the counties of England.

The following table shows some of these variations in different parts of England, and care has been taken to avoid the mention of places whose returns might be vitiated from the presence in them of large hospitals. There are only two exceptions to this rule, namely, Hastings in Sussex, and Liverpool in Lancashire. It will be noted that, in most of the counties represented, the difference between the highest and lowest

returns is more than 50 per cent, and in some the highest reading is more than three times that of the lowest.

TABLE III.—*Variations in the Consumption rate, at ages* 15–55, *per* 100,000 *living at those ages* (*Males*).

Counties.	Towns.	Highest.	Lowest.
Surrey	Guildford	526	—
	Farnham	—	242
Sussex	Hastings (H)	643	—
	Battle	—	180
Oxford	Headington	566[1]	—
	Banbury	—	241
Cambridge	Whittlesea	469	—
	Wisbeach	—	230
Norfolk	Walsingham	439	—
	Flegg	—	257
Wilts	Salisbury	438	—
	Mere	—	201
Cornwall	Redruth	461	—
	Launceston	—	223
Lincoln	Spilsby	361	—
	Caistor	—	205
Lancashire	Liverpool (H)	602	—
	Wigan	—	249
York	Reeth	589	—
	Settle	—	253

The same variation is to be found in other parts of the United Kingdom. Thus, in Scotland, consumption is almost unknown in the Western Hebrides, but, in towns on the west of the mainland, with a very similar climate and a similar race of people, it is very common. In Edinburgh, the rate per 1,000 deaths[30] is 102; in Glasgow, 371.

In Ireland, again, the rate of mortality from the disease per 100,000 of the population in the ten years, 1865–1874, was in the eastern division 259.62; in the western, 95.64.

Similar variations are to be observed in other parts of the world. Lombard gives the number of persons dying of consumption, per 1,000 deaths, in different places, as follows:

[1] Since this chapter was written I have been informed that the Radcliffe Infirmary, Oxford, is in Headington Union.

In Canada, the numbers vary from 241 in New Scotland to 138 in Quebec. In Russia, from 190 in Archangel, to 30 in Riga. In Holland, from 141 in La Dreuthe to 64 in Zealand. In Belgium, from 240 in Limbourg to 122 in Luxembourg. In Germany: Dresden 147, Weimar 74. In Italy: Milan 132, Turin 83. In Portugal: Lisbon 115, Malaga 54. In Egypt the general rate is 25, in Cairo 101. The variations cannot be due to climate, and probably arise from differences in the density of the population and in their mode of living.

But there is another mode of analysis possible. Perhaps the strongest proof of the existence of causes much more powerful than climate in producing a tendency to consumption, is to be found in the great differences between the male and female rates of mortality from the disease, in the same towns and districts. In the following table, I have selected from "Lowe's Tables" the male and female rates—(1) in places where the male rate exceeds the female rate, and (2) in places where the female rate is much the highest.

TABLE IV.—*Annual Average Proportion of Deaths from Consumption between the ages* 15 *and* 55 *per* 100,000 *persons living at those ages between the years* 1861–1870.

	Towns	Males	Females	Differences
(1.)	Cambridge	570	395	− 175
	Whitechapel	560	430	− 130
	Bath	540	255	− 185
	Greenwich	525	375	− 150
	Brighton	520	345	− 175
	Southampton	500	385	− 115
	Birmingham	475	345	− 130
	Newcastle	470	395	− 75
	Salisbury	440	305	− 135
(2.)	Sedbergh	365	615	+ 250
	Congleton	360	595	+ 225
	Bootle	225	555	+ 330
	Leek	355	525	+ 170
	Belper	275	455	+ 180
	Buckingham	275	455	+ 180
	Sevenoaks	290	455	+ 165
	Alston	285	425	+ 140

Towns	Males	Females	Differences
Camelford	230	295	+ 155
Battle	180	365	+ 185
Pickering	160	315	+ 155
Billesdon	120	265	+ 145

The differences between these figures, concerning two groups, male and female, of the population of the same places, constitute the main points of my argument at present, but I shall presently have occasion to return to them and attempt to draw from them the other lessons that they teach. The accompanying diagram shows graphically the differences between the male and female rates in towns and country places.

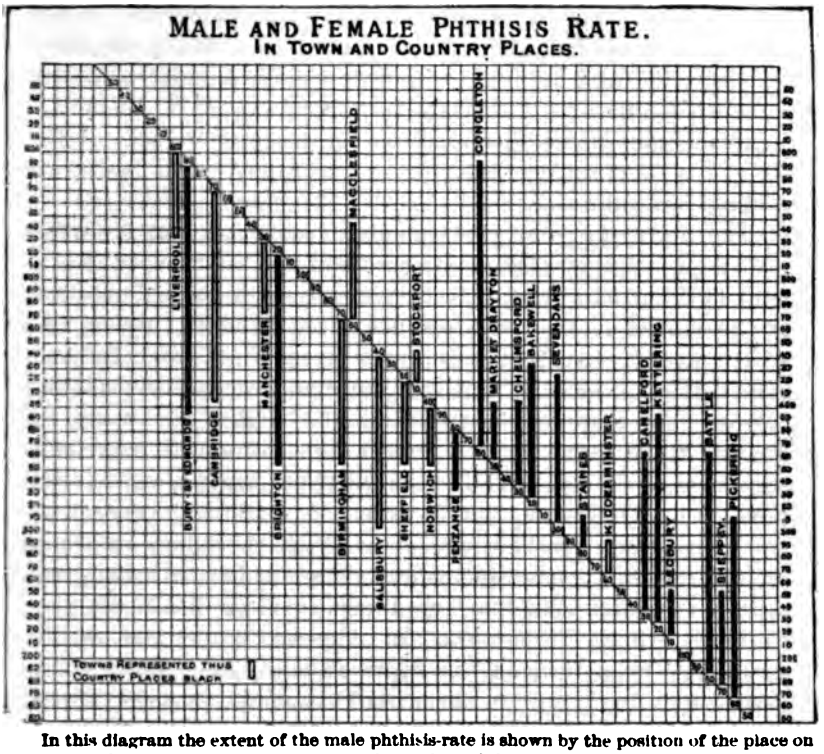
Enough has now been shown from the details of the statistics at our disposal, to prove that we cannot find in mere climate enough to account for the varying prevalence of consumption.

We have yet to consider the causes of the existence, upon the earth's surface, of cases of immunity from the disease. We have seen already that there are large tracts of country that are nearly, if not quite, free from the disease, and although this immunity may be due to sparseness of population, it is reasonable to ask whether an analysis of the figures may not bring to light some climatic or other conditions less favorable to the disease.

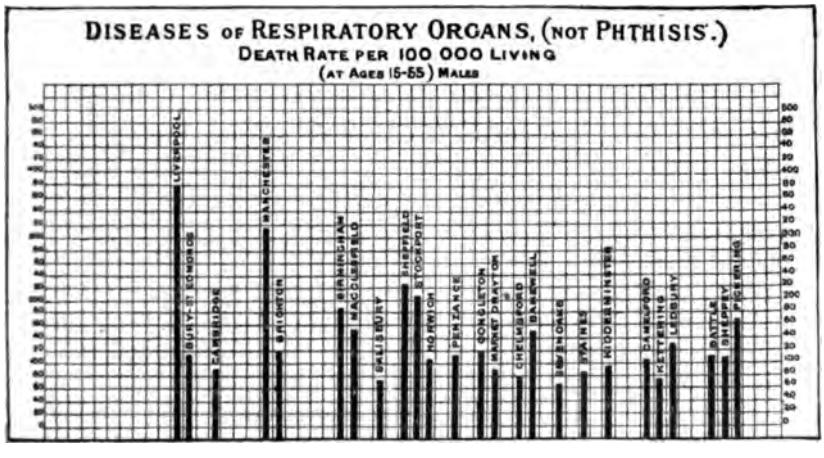
In Lombard's maps we have seen that there are certain broad spaces, untinted with color, showing regions still untainted by the disease. These spaces may be grouped broadly, under three heads:

1. Deserts, or sparsely populated places.
2. Mountain ranges or high plateaux.
3. Arctic, or subarctic regions.

It is not surprising to find that consumption is rare in the first of these groups. Where there are few human beings it is hardly likely that there will be much disease. But it is not merely the scarcity of possible victims that makes the disease uncommon, for the proportion of cases to the number of inhabitants in these districts is also very low, so far as we can judge from the imperfect data at our comand. Thus we are told by both Lombard and Hirsch that there is almost complete immunity from the disease in Nubia and Upper Egypt,



In this diagram the extent of the male phthisis-rate is shown by the position of the place on the diagonal line; the differences between the male and female rates by the length of vertical lines—above the diagonal line when the female rate is the greatest; below when it is least.



that it is very rare in Abyssinia and Central Africa; in the capital town of Oran, with 25,000 inhabitants, it is practically non-existent; and Livingston states that it is quite unknown in South Africa and in the interior of Cape Colony. It is rare in Asia Minor, Mesopotamia, Syria, Arabia, and Persia. In the steppes of Tartary, the interior of Australia, and in Tasmania it is almost unknown.

There are, however, certain considerations, apart from the wide separation of these districts from one another, that prevent us from ascribing this freedom from disease altogether to the climate. These spaces are often bordered by regions where the disease is much more frequent. Thus, in Asia Minor, it is often met with on the coast or in the principal towns. The Bedouins on the coast of the Red Sea, "who exchange their tents for stone-built houses," suffer from consumption.[31] In Syria, it is met with at Aleppo, and in the Soudan at Khartoum. In Zanzibar it is said to be especially common among Arabian women of the higher class—perhaps owing to their greater seclusion. While it is rare among the native Persians, who live an almost open-air life, it is more common among foreigners. In Algeria, while the nomad Arabs are free, "among the captives many die from the disease;" and in Egypt it is noted that while Syrians, Turks, Armenians, and Europeans seldom contract the complaint, Jews often become scrofulous, and die frequently of consumption. At Alexandria the mortality is nearly double that in England. In Australia it is almost as common in the large towns as it is in Europe. Again, we have to note the fact that in many parts of the world formerly almost free from the disease it is now rapidly increasing in prevalence. Information to this effect comes to us not only from Australia, but from Greece, Brazil, New Zealand, and the United States of America. Some observers state[32] that consumption is unknown in the western prairies of Illinois, Missouri, Iowa, Wisconsin, and Utah, and also in the Rocky Mountains; but, according to others, it has of late begun to show itself much more frequently, especially among the female immigrants. The climate has not changed, but the conditions under which life is carried on, especially the crowding together of the inhabitants, have altered, hence the increase of the disease. As Hirsch remarks,[33] "an altered mode of life among whole popu-

ations has had a most decided influence upon the rise and progress of consumption, while the climate in which they live remains the same as it was before.

Influence of Elevated Sites.

The second group of districts free from consumption, or nearly so, is of those parts of the earth elevated to a certain height above the level of the sea. In Lombard's map of the distribution of the disease, all the great mountain ranges are left blank: the Dovrefeld, the Ural Mountains, the Alps and Apennines, the sierras of Spain, the Carpathians, the Hartz, the Grampians in Scotland; in Asia, the high plateaux of Armenia and Persia, the Himalayas, and the mountain ranges of China; the table-lands of Abyssinia and of Mexico in North America, and the table-lands of Quito and of the Andes in the south continent. In all parts of the world, then, and in all climates, an elevated site seems to be, to some extent, a safeguard against consumption. The degree of elevation conferring this immunity was supposed by Gastaldi (who was one of the first to notice it) to be over 600 metres—about 2,000 feet—the disease being as common at points just under that height as on the plains. But in Western Texas, at a height of 2,100 feet, consumption is not uncommon; and the same observation has been made respecting the elevated plains of Castile and Leon, and of the Styrian highlands. It has been conjectured also that the freedom from the disease was due to the greater rarity of the atmosphere at these heights. (Dr. Marcet has recently carried on a series of observations upon the influence of altitude upon human respiration, which may throw some light upon the advantage of high levels in the treatment of phthisis (Proc. P. S., Vols. XXVII., XXVIII., XXIX., XXXI., and XLVI.). He proves that the volumes of air required to yield the oxygen necessary for the production of a given weight of carbonic acid, are smaller on mountains under diminished pressures, than in the plains under high pressures (the mean difference was 12 per cent); and he concludes that the respiratory function is therefore carried on more perfectly at these heights than in the plains.) But it must be remembered that the population of these elevated regions is much less dense than that of the lower ground, and

that the air in consequence is much less polluted with organic matter. Mountain and sea air are notoriously much freer from organisms than the air of plains, and Dr. Henry Bennet ascribes the beneficial influence of the climate of Mentone to the fact that the air breathed by the inhabitants must come either off the sea, or else over a range of mountains 4,000 feet in height. That the immunity is not simply due, however, to the rarity of the air is completely proved by Dr. Emil Müller, who, in his treatise on the "Distribution of Consumption in Switzerland," shows that there is no complete immunity from the disease in that Alpine country. A certain proportion of the inhabitants of these high places die of the disease, the rate depending, not upon the elevation of their dwellings above the sea, but upon the nature of their occupations. Industrial in-door pursuits give a rate varying from 6.5 to 10.2 per cent, and one of the highest of these rates (9.8) is at an elevation of 3,400 to 4,400 feet. At 4,400 to 5,000 feet, in mixed labor, the rate from the disease was 7.7 per cent. Here, then, we are obliged again to fall back upon the conditions of social life as a much more powerful factor than the influence of climate or locality.

Influence of Soil.

Closely allied to this point is the question of the influence of soil upon the disease. It has been shown by Dr. Bowditch in America, and by Dr. Buchanan in England, that places situated upon a damp impenetrable subsoil are much more subject to consumption than those placed upon a porous soil. Good drainage also has been found to diminish the prevalence of the disorder by as much as 50 per cent. These results have since been confirmed by Dr. Haviland, and by the Registrar-General of Scotland.

In the conclusions drawn from his map of the distribution of phthisis in England and Wales, Dr. Haviland says: "Damp, clayey soil, whether belonging to the wealden, oölitic, or cretaceous formation, is coincident with a high mortality;" and the Registrar-General, in his seventh report, remarks that "the towns, villages, hamlets, or houses which were situated at or near undrained localities, or were on heavy impermeable soils or on low-lying ground, and whose sites were consequently kept damp, had a very much larger number and pro-

portion of cases of consumption than towns, villages, hamlets, or houses which were situated on dry or rocky ground, or on porous light soils, where the redundant moisture easily escaped."

In an address to the Sanitary Congress, held at Leicester, in 1885, I gave the details of an inquiry I had myself made into this subject, that goes even further than those already cited—a contrast between two populations, one being on clay lands, the other on a hill of sand. The result was derived from a ten-years' mortality table, and was that, whereas in this period there had originated twenty-two cases per 1,000 inhabitants on the clay lands, on the sand only one per 1,000 had thus suffered, and that not one of the children or females of the population who were constantly resident there had contracted the disease. In this instance, however, we had not only the influence of a dry soil to deal with; the houses were those of well-to-do people, and were fairly well ventilated. Whether there would have been the same immunity under other conditions is very doubtful. Still it is evident that there is a close relationship between the condition of the soil and consumption, a relationship so close that, as we have seen, a residence on a porous soil, under otherwise favorable hygienic conditions, will apparently preserve the whole community from the disease.

It is further noticeable that in these cases hereditary predisposition makes no difference in the result. There were present in these populations many whose parents or near relations had died of the disease, and yet they did not contract it so long as they lived in the place.

And yet there is no necessary connection between dampness of soil and consumption. Dr. Buchanan's experience with respect to the influence of drainage of towns has not always been confirmed by other observers. (Dr. Kelly, M.O.H. for East Sussex, has shown that in 1861–70, the mortality of the several districts named by Dr. Buchanan had changed from that of 1851–60 without any difference of drainage.) Thus, "at Ashby-de-la-Zouch, the mortality from phthisis rose 19 per cent after the ground was drained." In Brunswick, according to Reck, "the mortality from consumption has not been greater in the wet parts of the town than in the quarters on a dry soil." "In Dantzic, where a system of main drainage

was carried out fully in 1871, the death-rate from phthisis, which had been (according to Lievin) 2.12 per 1,000 in the eight years preceding (1861–70), rose in the nine years following (1871–79) to 2.48 per 1,000." "At Berlin, in like manner, no notable effect on the prevalence of phthisis can be traced to drainage of the ground,"[34] and Hirsch says: "It seems to me to be a more probable explanation that other etiological factors, besides the influence of soil, come into the account under the given circumstances—factors that have a modifying effect upon the amount of the sickness, and serve to neutralize the benefits even of the most favorable conditions of soil."[35]

Moreover, there are, in different parts of the world, large tracts of country that are excessively damp, many of them indeed wholly given over to malaria and to intermittent fevers, and yet these districts are so free from the prevalence of consumption that some continental writers have supported the view that ague is antagonistic to phthisis. This theory has been conclusively proved to be erroneous,[36] but the different behavior of the disease in different districts would of itself be sufficient to show that the connection between dampness of soil and tubercular disease is not essential, and that the influence is one simply of predisposition, and favorable only to the development of the micro-organism when introduced by other means.

Influence of Cold.

The last group of districts, to a great extent exempt from consumption, consists of the arctic and subarctic countries of Greenland, Labrador, Iceland, Spitzbergen, Nova Zembla, Finland, Siberia, Canada, and the northern parts of the North American continent.

These are all cold countries, and it is owing to the geographical position of this group of districts, that we are unable to say that climate is wholly without influence upon the disease.

We do not know why extreme cold should be thus antagonistic to consumption, and the fact is entirely opposed to the notions of our forefathers on the subject. Not many years ago it was supposed that cold and exposure to the weather were among the most potent of the causes of consumption. Patients were sedulously guarded from every breath of cold

air in well-warmed rooms, or they were sent to warm, relaxing climates, such as those of Montpellier or Madeira.

We understand now somewhat better the operation of bright, dry, sunny atmospheres, and we know that their beneficial influence arises rather from their tempting the poor consumptive invalid into the open air, than from their freedom from cold.

It is now certain that not only is there comparatively little consumption in cold climates, but that many people predisposed to the disease, or actually consumptive, derive great benefit from a sojourn in the keen, dry, cold air of Canada, or from a winter spent amid snow and ice at Davos Platz or the Engadine.

But it is not yet clear in what way a cold climate exerts this favorable influence; we may indeed surmise that the lower amount of humidity in the atmosphere of these regions may have something to do with the results. Cold air has a much smaller capacity for aqueous vapor than warm air. It may thus be less capable of sustaining the life of the microscopic organisms that are the exciting cause of consumption; or again, it is possible that there are smaller quantities of organically-charged vapors arising from the ground, frozen as it is for so large a portion of the year. Moreover, in a frosty air the condensed moisture may entangle the organisms in its meshes, and may carry them down out of harm's way.

But all these suggestions are mere guesswork, and there are as yet no certain proofs as to the mode in which the tendency to consumption is lessened in these regions. Here again, also, we must notice the circumstance that all these countries are very sparsely populated, and that there is, therefore, comparatively little respiratory impurity constantly floating in the air. Moreover, just as it was found possible for men to override the beneficial influences of an elevated site, so, in cold climates also, they may live under conditions such as will lead to consumption as certainly as in less favored countries. Thus we are told by arctic voyagers, that the Esquimaux are not seldom affected by consumption, and the fact is hardly strange when we consider the mode in which they exclude all the air they can from their crowded huts. In Greenland, phthisis is one of the commonest causes of death, and similar reports come from New Archangel and

Alaska. In Canada also at one time the soldiers sent to that station died of consumption at three times the rate of the ordinary civil population in England in healthy districts.

The mortality from this disease among the troops in Canada, in the years 1830 to 1837 was no less than 23 per 1,000 of strength; and in healthy districts in England and Wales, at ages corresponding to those of the soldiers, the rate was only 7.7. In all England the rate was 9.2, and in Manchester, with all its unfavorable surroundings, it was 12.4, little more than half the military rate in Canada. The cause of this heavy mortality was discovered to be bad drainage, and want of proper ventilation of the barracks; and after these defects had been remedied, from 1863 to 1872 the rate was 9.49, and in 1874 it was only 6. These facts again point to other conditions of much more importance than that of climate alone.

2. We may next inquire statistically into the influence of malnutrition. It is not surprising that, at one time, tubercular disease should have been ascribed to some form or other of bad nutrition, and especially to a deficiency of fatty food. The poor ill-nourished denizens of towns have always furnished the largest proportion of victims of the malady. Thus it was found by M. Marc d'Espine that at Geneva, in every 1,000 deaths among the poor, 233 were from consumption, while of the rich, only 68 were from this disease.

And there are still medical men of eminence who ascribe to this cause the chief part in preparing the body for the reception of the bacillus.

Dr. Jaccoud, in his work on phthisis, affirms that the consumptive constitution is essentially due to "insufficient nutrition, taking this word in its widest sense."

M. Bouchardat also, in his treatise on hygiene, published in 1883, affirms emphatically that "the continuous loss of calorific elements, in any considerable proportion, leads to pulmonary tuberculosis" (p. 665). He defends this opinion by reference to the large mortality among cows, from tuberculosis, when the supply of milk is forced, and by the appearance of tuberculosis in the lungs of diabetic patients, when the elimination of sugar has taken place to any considerable extent for a sufficiently long period (p. 653).

He even ascribes the 68 deaths, in Marc d'Espine's tables

among the well-to-do, to some form of "Misère physiologique."

No one can doubt that want of sufficient food and mental distress are powerful agents in preparing the ground for the successful sowing of the seeds of consumption, but even if we had not known of the existence of a specific organism, and indeed before it was known, statistics were forthcoming to show that these causes are by no means essential to the production of the disease.

The terrible mortality from phthisis that prevailed at one time among the finest soldiers of the British army was certainly not brought on by starvation or misery. It occurred for the most part when they were not on active service, but in a time of peace, when they were well fed and well cared for so far as their bodily comfort was concerned—far better, in fact, than the half-starved workpeople and laborers, who only died of the disease at one-third the rate that they did.

3. Similar remarks, so far as the army and navy are concerned, would apply to the next series of supposed causes of consumption, namely, hardship, exposure to the weather, and cold. Nay! these conditions might rather be said to be antagonistic, than favorable to the onset of the disease.

The poor fishermen of Iceland, the hunters and trappers of North America, the nomad tribes of Asia and Africa, the wretched natives of Australia—all these people escape the disease almost entirely, while one-third of the deaths of the well-protected, well-clothed adult inhabitants of towns are from this cause.

The Highlanders, who inhabit well-built houses on the mainland of Scotland, are subject to the same fate as the other inhabitants; while the ill-fed, ill-clothed fishermen of St. Kilda and the Hebrides, who are of the same race, hardly ever contract the disease.

A striking case in point is quoted by Dr. H. Bennet from Professor Hind. "Consumption," he says, "is unknown among the natives of Labrador, while they remain in their own country. Here they live a kind of wild life, in tents made of spruce branches, imperfectly lined with skins, and more or less open on all sides to the air. They are exposed to famine and all kinds of hardship; but when they come down the great river, St. Lawrence, to take part in the fisheries, they occupy well-

built houses, and being well paid, they live in comparative luxury, and then in the course of a year or two become consumptive, and thus miserably perish."

We shall presently have to inquire into the question how far inflammations of the respiratory apparatus constitute a predisposing cause of consumption; but, whatever may be the outcome of that inquiry, it scarcely affects the present issue. It is very doubtful whether exposure to the elements, taken alone, is a common cause of these inflammatory attacks. We do not find that men who are much in the open air, and exposed to all vicissitudes of weather, are especially prone to catarrh or affections of the lungs. Soldiers on campaign, sailors, fishermen, hunters, gypsies, engine-drivers, coachmen, gardeners, agricultural laborers—none of these people suffer much from colds, unless they are intemperate. Arctic explorers confront the chilliest air that ever flowed. We are told also that Whymper slept safely "*sub divo*, in chill Alaska, with only a screen to windward, when the mercury in his barometer was frozen hard, and Von Wrangel relates quite a similar experience in respect of the dwellers by the shores of the Arctic Ocean."[87]

The experience of volunteers, who are generally men unaccustomed to open-air life, is to the same effect. On the other hand, we know that the inhabitants of towns not only contract diseases of the lungs, but die of their consequences in excessive numbers. It has been calculated that in Manchester people die of these complaints at more than three times the rate that people do in breezy Westmoreland. Mere exposure to cold and hardship and privation are not, therefore, to be reckoned among the causes of consumption.

But a closer inquiry into the figures laid before us gives not only negative but positive information as to the secondary causes of consumption, and we may safely draw the following conclusions from them :

1. That the occupations of a people have an important influence over the disease.

2. That its fatality increases with the herding together of populations.

It is probable that these two propositions have a good deal in common in respect to the causation of the disease, but it will be convenient to consider them separately and in detail.

1. *Influence of Occupation.*—There can be little doubt as to the indications given by our figures, respecting the injurious influence of certain occupations in predisposing to lung disease, and ultimately to consumption. The mere fact that in most countries where manufacturing processes are carried on the worst places are seen to be the manufacturing centres, would in itself be sufficient to arouse suspicion on this head. Thus, in England, the manufacturing counties of the north-west and west are the highest in the scale of mortality. In Dr. Haviland's map, if we leave out Wales, with its very doubtful statistics, we shall find the spots of darkest blue in the immediate neighborhood of the industrial centres in Lancashire, Cheshire, and Yorkshire.

In our own chart (see p. 198) the two highest columns of disease are those of Brunn in Moravia and Remscheid in Austria, and both of these are actively engaged in manufacture, the former of woollen goods, the latter of iron and steel. Nor are we left without direct testimony on this point. Drs. Headlam Greenhow and Arlidge in England, Finkelnburg and Schweig in Germany, Meynne in Belgium, Boudin and Chatin in France—all these observers concur in attributing a malefic influence to certain kinds of work.

In his report to the Privy Council in 1858, Dr. Headlam Greenhow pointed out the influence of occupation as a cause of pulmonary disease; and in 1860 and 1861 he followed it up by two admirable special reports upon the subject.

Without going into the minutiæ of these reports, it may be sufficient to summarize his conclusions, as to the conditions that render workpeople peculiarly liable to these diseases, by arranging them under the four principal heads:

1. The inhalation of dusts of various kinds.
2. Stooping postures at work.
3. Exposure to changes of temperature.
4. Bad ventilation.

But before considering his figures, it is important to observe that in his first report Dr. Greenhow grouped together all forms of disease of the respiratory organs—doubtless in order to avoid errors of diagnosis—and although in his later papers he gives the figures for phthisis and the other pulmonary diseases separately, it is significant of hesitation to accept the figures, that, in his final summing up at the end of each report,

he reverts to his former nomenclature, and speaks in general terms of "pulmonary disease."

In considering the etiology of phthisis we are bound to follow the example of this caution, and to decline to accept the figures placed before us as relating to tubercualr disease. It is also needful to attempt to distinguish between the direct effects of the occupation itself and those of the ordinary modes of life of the worker.

The subject further opens up wide pathological questions as to the modes in which the injuries sustained by the workpeople lead to true tubercular disease. The discussion of this [illegible] would, however, lead us away from the domain of statistics with which we are now occupied, and it will therefore be best to reserve it for future consideration.

With these reservations we may turn to the conditions mentioned as causes of pulmonary disease:

The Inhalation of Dusts of Various Kinds.—Dr. [illegible] statistics point to this occurrence as directly productive of pulmonary disease, including phthisis: but we can [illegible] to the latter category many of the cases included under this head in his figures—unless the word is so [illegible] to cover those of a non-tuberculous char-

[illegible] that the kind of disorder at first produced is [illegible] In many cases—such, for instance, as [illegible]—the disease is at first one arising simply [illegible] irritation of the air-passages; and this irri[illegible] may lead on to emphysema, or to hardening and con[illegible] of the lung tissues, and ultimately to their destruc[illegible] a very difficult to distinguish from true consumption. [illegible] that the particles of dust of various kinds may [illegible] into the tissues of the lungs and to the bron[illegible] glands, as was shown by Traube, Virchow, and Zenker, [illegible] by Von Ins, Sikorski, and others.

[illegible] forms of these pneumono-konioses have been de[illegible] arising from particles of coal dust, steel filings, dust [illegible] glass or porcelain, and even from tobacco and [illegible] dust. Doubt has been expressed as to whether most of [illegible] cases are not truly tuberculous (notably by Hilton [illegible]), but those who have had much to do with such pa[illegible] cannot share this opinion. I am quite sure that there

are many cases of true cirrhosis or fibroid disease of the lung, sometimes produced by irritating dusts, at others by pleuritic attacks often repeated, and ending in thickening and contraction of the interlobular septa, and, so to speak, in a strangling of certain portions of the lung. I have watched such cases for years, and have satisfied myself by repeated stainings that there were no bacilli in the sputum—and after death no signs of tubercle in the lungs. Such cases are, however, with difficulty distinguished from true phthisis. We must, therefore, look with some suspicion upon the tables laid before us; but, inasmuch as tubercle may undoubtedly be engrafted upon a lung injured by dust, it behooves us to inquire into the relative proportions of persons engaged in different trades, who are said to have died of phthisis.

The observation as to the injurious influence of dusts in this regard is by no means a new one. I need only note the elaborate works of Ramazzini and Thackrah on the subject.

Wepfer, in 1727, speaking of millstone-grinders, says: "Omnes phthisici fiunt."

Even if we assume that many workpeople commence with simple irritative diseases, we cannot refuse to recognize their trades as truly causes of consumption, if we find that large proportions of those who work at them ultimately fall victims to that malady.

All dusts, however, are not equally hurtful. The following lists, abridged from Hirt's tables, show how greatly the incidence of phthisis from this cause may vary.

TABLE V.—*Percentage of Phthisis in Total Numbers of Sick among Workmen Exposed to the Inhalation of Dusts of Various Kinds.*

Metallic.		Mineral.	
Needle-polishers	69.6	Flint-workers	80.0
File-cutters	62.2	Grindstone-makers	40.0
Lithographers	48.5	Stone-cutters	36.4
Grinders	40.4	Plasterers	19.0
Dyers	25.0	Porcelain-makers	16.0
Painters	24.5	Potters	14.7
Printers	21.6	Masons	12.9
Tinkers	14.1	Cement-makers	8.0

Vegetable.		Animal.	
Cigar-makers	36.9	Brush-makers	49.1
Weavers	25.0	Hair-workers	32.1
Millers	10.9	Turners	16.0
Bakers	7.0	Button-makers	15.0
Mixed.		**No dust.**	
Glass-cutters	35.0	Shoemakers	18
Glass-makers	17.8	Glovers	10.0
Day laborers	15.1	Butchers	7.0

It is evident from this list that the sharpest and most irritating dusts are those that tend most surely to produce lung disease, ending eventually in consumption.

The hardest and most pointed dusts, such as those from steel and flint, produce the most baneful effects, and after them come fine cuttings from bristles and the spiculæ of glass and porcelain. (This observation coincides with the results of Dr. B. W. Richardson's inquiry.) The dust of flour and the delicate fibres of cotton and wool do but little harm. This result is in accordance with our experience of the influence of the staple manufacture of my own neighborhood. In an inquiry as to the health of cotton operatives, Mr. Royston and I discovered that these workpeople are not more liable to consumption than the ordinary laborers of the town, the percentage of deaths from affections of the lungs being 61 for the former and 60 for the latter.[88] We came to the conclusion that "although these affections may be partly due to mechanical irritation from cotton-fibre and other substances arising from the work, they are still more frequently produced by the subtle diffusion of smoke in the atmosphere and the general vitiation of the air by noxious vapors and gases." Dr. Tracy, in Buck's "Hygiene," says: "It is doubtful if cases of phthisie cotonneuse occur at all in this country."

There are some differences between the arrangement of the trades in the order of their degrees of danger, as given by Hirt and by others; thus Eulenberg, in the "Handbuch der Gesundheitswesens," with regard to the mortality in Prague, gives the order of phthisis mortality as follows: Bookbinders, goldsmiths, glove-makers, stone-cutters, printers, turners, waiters, forgemen, locksmiths, bakers, joiners, potters, barbers, coopers, musicians, braziers, shoemakers, varnishers,

tailors, furriers, weavers, masons, butchers, brewers, tanners, mountaineers, gardeners, millers, room-decorators, ship-builders, coachmen.

The differences between the several sets of statistics are probably due to variations in the conditions under which the several classes of artisans did their work, but they add to our reluctance to receive the figures as evidence of the influence of the trades themselves, and make it probable that the conditions in question had at least as much to do with the result as the occupations.

In this regard, it is interesting to note that Seltmann [39] and Mirkel believe that the inhalation of carbon is antagonistic to the development of tubercle, and Mr. Simon [40] has called attention to the fact that the coal-miners of Durham and Northumberland are not especially liable to lung disease, and he accounts for this by pointing out the good ventilation of the mines in which these men work.

2. *Stooping and Constrained Postures during Work.*—The next great exciting cause of phthisis mentioned by Dr. Greenhow is the interference with the respiratory apparatus by posture, and he adduces as evidence the heavy mortality of the women and girls employed in the lace and hosiery finishing and winding looms at Nottingham, the watchmakers of Coventry, the hand-loom weavers of Macclesfield and Leek.

The following table, drawn from Dr. Greenhow's reports, shows how greatly the phthisis ratio of these artisans exceeds the standard:

TABLE VI.—*Death-rate per* 1,000 *Living from Pulmonary Affections.*

	Males.	Females.
Nottingham	8.13	7.03
Coventry	6.61	5.73
Macclesfield	7.43	8.51
Leek	7.80	8.51
Six northern standard districts	2.97	3.04

It is again difficult to separate the operation of this condition of work from other influences adverse to health, such as insufficient food and bad air.

Still it is evident that, from some cause or other, workpeople, who have to carry on their occupation in constrained

postures, do actually suffer more than others from consumption, and we shall presently see that modern research affords a reason why this result should probably follow.

On the other hand, it is only right to notice the observation of Rokitansky, Wagner, and others, and which has been generally confirmed by experience, that hunchbacks are but seldom affected by tubercular disease of the lungs. (I can myself only remember three such cases in my own practice.)

Moreover, the miners, whose exemption from phthisis has already been mentioned, work in the same cramped postures as their brethren in other coal fields.

3. *Exposure to Variations of Temperature, Moisture, etc.*—This includes the third class of conditions that, according to Dr. Greenhow, render workpeople peculiarly liable to pulmonary disease; and he especially instances the cases of slip-makers in potteries, and the spinners of flax, who are naturally exposed to heated and moist atmosphere, and the workpeople in overheated factory rooms.

There can be little doubt that these conditions, taken in connection with bad ventilation, have much to do with the prevalence of diseases of the respiratory organs; but, as we have already seen, they can only be very remotely implicated in the causation of phthisis, and I shall not therefore dwell further on this point. I have already shown that exposure to the weather alone is actually a preservative against both catarrhal affections and phthisis, and the statistics of occupations abundantly confirm this view. Engine-drivers and stokers on railways are certainly not specially liable to these disorders. Blacksmiths and charcoal-burners are peculiarly free from them. Forgemen, iron-puddlers, and glass-blowers also are not prone to contract consumption, though the last-named class are subject to emphysema.

The stokers on steamships must indeed be excluded from the category of persons thus free from a consumptive tendency; but another cause affects them, for their quarters are, for the most part, very contracted and badly ventilated.

4. *Working in Ill-ventilated Rooms.*—We have now reached the last of the conditions mentioned by Dr. Greenhow, as tending to the production of consumption among workpeople, and it is impossible to resist the conclusion that it is the most powerful of them all. Most, if not all, of the condi-

tions that we have found to lead to consumption have had associated with them air rendered impure by breathing, and allowed to stagnate through want of proper ventilation. The dusty atmosphere in workshops is also often a confined atmosphere; the persons who work in a constrained or stooping posture do so for the most part in crowded, ill-ventilated shops or workrooms, or in the recesses of mining galleries; and the effects of variations of temperature in factories are aggravated by the same cause. But there is plenty of direct evidence on the point. Dr. Greenhow's inquiry, in 1860, led him to the conclusion that "in proportion as the male and female populations are severally attracted to in-door branches of industry, in such proportion, other things being equal, are their respective death-rates by lung disease increased."

He instances especially as occupations injurious in this regard: 1. The making of earthenware and china, as at Stoke-on-Trent and Wolstanton. 2. Tin and copper mining (Penzance and Redruth). 3. Lead-mining (Reeth). 4. Flax factories (Pateley Bridge). 5. Silk-working (Macclesfield and Leek). 6. Wool factories (Leeds, Bradford, etc.). 7. The making of hosiery (Leicester and Hinckley). 8. Cotton factories (Preston). 9. Lace-making (Towcester and Newport-Pagnel). 10. Straw-plaiting (Berkhampstead). 11. Glove-making (Yeovil). This is a long list, and it already contains several of the trades whose tendency to phthisis had been set down mainly to other causes, notably the potters of Stoke-on-Trent, whose illness had been ascribed to dust; the silk-workers of Macclesfield and Leek, who were supposed to have suffered from stooping during their work; and the spinners of flax, who are also exposed to variations of temperature; but, in truth, Dr. Greenhow's reports abound in notices of the bad ventilation of all kinds of workrooms, and instances of the good effect of ample cubic space and of free currents of air.

Thus he mentions the intolerance of ventilation shown by mould-makers at Stoke,[41] the bad ventilation of flax factories at Pateley Bridge (p. 149); the overcrowding and want of ventilation of living-rooms and factories at Macclesfield and Leek (p. 155). In one of the latter the space was less than 200 cubic feet per head, and of ventilation there was none.

But, perhaps, the most striking proof of the influence of confined air, in the production of consumption, is to be found

in the relative death-rates from this disease among males and females respectively, which have already been given. (See Table IV. and Diagram, p. 205.) The greatest range of difference in these rates is found in the agricultural districts, where the men are mostly employed out-of-doors, and are but slightly affected, while the women are employed at home, and die of consumption at twice the rate of the men. I would especially instance Battle, Pickering, and Billesden. It will further be found that in manufacturing towns, the incidence of phthisis is heaviest upon that sex which has most to do with in-door employment.

On the whole, as Mr. Simon says,[42] in his summing up of the evidence, "among the aggravating circumstances that may indefinitely increase this evil [lung disease], probably none is so effective as the bad ventilation of the work-place."

"The concurrent testimony of these most various illustrations is that, commonly, where many persons are employed together at any in-door industry, the ventilation of the work-place is likely to be so bad as to convert the employment, which perhaps is not in its own nature of hurtful tendency, into an employment seriously dangerous to health. Here lies the explanation of a fact most deplorable for the working classes of our country—that, in proportion as the people of a district are attracted to any collective in-door occupation, in such proportion, other things being equal, the district death-rate by lung diseases will be increased. For the bad ventilation, which, as a rule, belongs to the place of employment, tends to develop among the workpeople a large excess of phthisis, and probably also some excess of other fatal lung disease."

5. *Air Rendered Impure by Respiration.*—We are thus led inevitably, by the statistics, to the reason for Dr. Greenhow's second proposition, that the fatality of lung disease increases with the herding together of populations in large towns, and this is, that the truly infective impurity of the air must be in some sense a respiratory impurity. We have already seen that the specific organism of tubercle has been discovered in the air of consumption hospital wards—in the dried-up sputa of phthisical patients, and even, though rarely, in the aqueous vapor exhaled from their lungs. It was therefore certain that the disease must be mainly derived from this

source; but we now see, from the concurrent testimony of facts, drawn from the geographical distribution of the disease, and from the rates of mortality from lung disease among workpeople, that the power for evil of the disease-germ increases, *pari passu*, with increase in the density of the poison.

Baudelocque, in his treatise on scrofulous disease, was perhaps the first clearly to see that this was so. Speaking of air rendered foul by breathing, he says: "This is the true cause—perhaps the sole cause—of the disease of scrofula," and he adduces many proofs in support of his theory.

Sir James Clarke also, in 1835, in his monograph upon consumption, speaks of "the respiration of a deteriorated atmosphere as one of the most powerful causes of the disease." (But the truth was hardly fully accepted until Dr. McCormac took up the subject, and with iteration insisted that, "wherever there is foul air, unrenewed air, impure air . . . there we meet consumption, there we meet scrofula and an untimely death.")

In one of his early letters to the Registrar-General, Dr. Farr gave some statistical evidence to show that the mortality from diseases of the respiratory organs and from phthisis is in direct ratio to the density of population. The following table is drawn from the annual report:

TABLE VII.—*Mean Mortality in three groups of the Thirty-two Metropolitan Districts*, 1839.

Districts	Square yards to one person	Annual rate per 100,000		
		Totals	Respiratory organs	Phthisis
1 to 10	57	3321	822	478
11 " 20	78	2839	768	451
21 " 30	217	2169	588	354

The table (p. 173) showing the mortality in different parts of the world, drawn up for the Army Sanitary Commission, bears witness to the same facts; and the commissioners, in their report, point out that "in civil life, insufficient clothing, insufficient and unwholesome food, sedentary and unwholesome occupations, and the vitiated atmosphere of unhealthy dwellings, all contribute to the propagation of this class of diseases. But in the army it cannot be alleged that the clothing, the food, or the nature of the occupation in itself are of a character

which would justify the imputation that they are among the predisposing causes of the excessive mortality of the soldier by pulmonary disease.

"The ravages committed in the ranks of the army by pulmonary disease are to be traced in a great degree to the vitiated atmosphere generated by overcrowding and deficient ventilation, and the absence of proper sewerage of barracks."

In reference to this, Dr. Farr said: "The prevalence of phthisis in the armies of Europe is probably due in part to the inhalation of expectorated tubercular matter, dried, broken up into dust, and floating in the air of close barracks," and Dr. Parkes remarks that this prevalence "can scarcely be accounted for in any other way than by supposing the vitiated air of the barrack-room to be chiefly at fault." Mr. Welch, of the Army Medical School, Netley, also proves that consumption in the army increases with length of service, and that it is due in the first place to "vitiated barrack atmosphere," and to constant irritation of foul air inspiration . . . the chief deleterious agent in the generation of consumption being the organic matter, which, taken into the air-passages, there lodges, and chronically irritates."[43]

Dr. Parkes, in his work on hygiene, gives numerous instances of the influence of re-breathed air in the production of phthisis—instances drawn from the history of prisons, jails, and workhouses; and Hirsch, in his articles on scrofula,[44] and on consumption,[45] gives long lists of examples of the origin of both diseases under circumstances in which confined air must have been the principal factor.

But we have still not quite reached the limit of the aid to our inquiry that may be obtained from statistics of disease. We may push our investigation into still closer quarters, and, abandoning total death-rates of institutions and towns, we may examine into the mortality of certain districts, and even of certain houses.

In a paper on "Tubercular Infective Areas," read two years ago before the Epidemiological Society, I gave the details of an inquiry made into the incidence of phthisis in some of the worst districts of Manchester and Salford—an inquiry that was greatly facilitated by the kindness of the medical officers of health of these boroughs, and by the excellence of the mortality tables which they placed at my disposal. Its

results showed that the portions of these districts most affected by the disease were the close courts and alleys, the shut-in or blocked-up lanes, and, above all, the houses built back to back with no thorough ventilation. I especially noted the cases in which, in the space of five or six years included in the inquiry, double or treble occurrence of the disease had taken place in the same houses, and I found them very numerous.

These results have been confirmed by other observers. Thus Dr. Niven, of Oldham, writes to me respecting 3,001 deaths from tuberculosis, which occurred in that town during eleven years (1877 to 1887), and states that they took place in the worst class of houses, and in 302 cases there were two or more in a house. He has calculated mathematically the chance of any one house being twice affected (not infectively), and he finds that only sixty-eight, on this hypothesis, would have thus suffered, whereas 274 houses were so attacked, and that while not more than 7.6 houses should have suffered thrice, the actual number so attacked was 24.

In a joint report to the local government board, made in 1888, by Dr. Barry and Mr. P. Gordon Smith, on "Back-to-Back Houses," which included several of the districts which I had selected, the conclusion formed upon this point is, "that it appears probable that the want of through ventilation . . . gives rise to an increased mortality from pulmonary disease, phthisis, and diarrhœa."

Again, Dr. Flick, of Philadelphia, has recently carried out an elaborate topographic study of phthisis in that city, extending over a period of twenty-five years, and he draws the following conclusions: (1) "that a house which has had one case of consumption will probably have another within a few years, and may have a very large number of cases in close succession;" (2) "that when a case of consumption occurs in a house, approximate houses are considerably exposed to contagion;" (3) "that houses in localities where endemic after endemic has existed, have nevertheless escaped the disease;" (4) "that tuberculoses of different kinds occur in the same localities, and often on the same lots as consumption," and (5) "that during the twenty-five years scarcely 20 per cent of the houses of the ward were so affected."

He ascribes these results to contagion in the houses themselves.

These facts must be placed in apposition with Dr. Cornet's researches upon the bacillus-holding properties of the walls of houses in which consumptive patients have resided. They may probably afford an explanation of many of the facts detailed in the course of this chapter.

In the next chapter I will return to the subject of contagion.

CHAPTER III.

PREDISPOSING CAUSES OF PHTHISIS.

THE considerations and the evidence adduced in the preceding chapters may perhaps be sufficient to show the part that is played by the bacillus of tubercle in the production of the lesions of phthisis, and to indicate the chief circumstances that influence its general distribution among groups of mankind.

We shall now have to consider both the conditions that render individuals liable to contract the disease, and some of the modes in which the parasite gains an entrance into the body.

We have already seen that the disease may be found everywhere that men are congregated together, or, as it might perhaps be more correctly stated, everywhere that tuberculous individuals are, or have been, present within a recent period. Nor is it difficult to understand why this should be so, in the light of modern research. It has been calculated by Bollinger that one phthisical person may eject from his body in the course of twenty-four hours no fewer than twenty millions of bacilli. Moreover, for the greater part of their illness, consumptives are not confined to their rooms or to their houses. They go about like other people, and mix in crowded assemblies, discharging their bacillus-laden expectoration in every convenient place. The sputum thus ejected has been found by Koch to possess a marvellous tenacity of life, being still virulent in the dried-up sputum after a lapse of several months.

The walls of houses, and the dust that flies about in the air, have been shown by Cornet to contain the virus in an active condition.[46]

It is certain, therefore, that the germs of the disease are almost everywhere present, and that all of us inhale some of them in the course of each day or week.

It would seem also at first sight that, once received within the body, the bacillus would have no difficulty in obtaining nourishment and in growing. Professor Koch's observations show that the bacillus requires only a certain amount of moisture, a temperature of between 82° and 107° Fahr., and a supply of nitrogenous food, such as blood-serum—all of which conditions are to be found within the human body. The presence of phthisis in our midst ought not then to be difficult of explanation; we should rather, in the first place, seek out the reasons for the exemption of so many from the results of infection.

Reasons for Immunity from Tuberculosis.

Among the conditions necessary for the growth of the bacillus, there is yet one that was mentioned in the chapter, and which is of great significance, namely, that it requires a sojourn of one or two weeks, and sometimes more, in a suitable medium before it can take root, so to speak, and develop into a colony.

Now from Watson Cheyne and Dr. Kidd and others, we learn that the epithelium of the ultimate portions of the air-passages is usually the first point of attack by the organism. We may therefore suppose that it is necessary for the organism to effect a lodgment somewhere in this position.

Or again, it may perhaps make its way into the inter-alveolar lymphatics by means of the prolongations of the branched cells of the alveolar septa, called by Dr. Klein "pseudostomata," which he has shown to be capable of taking up foreign bodies, such as oxide of iron, silica, and even carmine (Sikorski).

It can hardly be doubted that, if these inorganic particles can thus find an entrance, the bacillus of tubercle may do the same, and thus the way into the body might be supposed to be opened to the organism; and, once planted in such soil, if it can remain there a sufficient length of time, it will find a suitable temperature and ample supplies of the nourishment that it requires; but there are in the healthy body various impediments, mechanical and physiological, which it is difficult for it to over-pass, and which will probably account for the immunity of all those in whom these barriers have not been previously broken down.

1. We have the difficulty with which minute bodies such as the bacilli could reach the ultimate air-passages.

It is true, as Professor Tyndall has shown by means of his illuminated tube, that the lungs possess a sort of filtering action, catching up the organic dust inhaled with the air, and preventing it from coming forth again with the returning breath, but this action is due to the entangling of the dust by the mucus lining the air-passages. Before it has reached the ultimate ramifications of these tubes it is caught on the glairy mucus, and is speedily ejected by the action of the ciliary waves.

That this filtering action is not complete, however, I have myself proved, both by the microscopical examination of the aqueous vapor of the breath, in which there were numerous epithelial scales and other objects, and by the detection of a few, very sparsely scattered, bacilli in the breath of certain consumptive patients.

In some forms of lung-disease, also accompanied by copious bronchial secretion, the probability of this event is increased, especially if the accompanying cough prevents the lodgment of mucus in any of the air tubes. As has been shown in the research just mentioned, the organic matter of the breath is always less when there is much secretion. The proportionate amount of this substance exhaled in the aqueous vapor from the lungs, was only one-half of that from healthy persons, not that there is really less organic matter thus excreted, but because it was taken up by the mucus before it could reach the mouth. The immunity from phthisis of many cases of chronic bronchitis and emphysema is, perhaps, due to this cause. On the other hand, the influence of a lessened mobility of the chest, and the consequent partial stagnation of the air, is shown in the tendency of the upper lobes of the lungs to tubercular deposit, and we may place in the same order of predisposing causes, the evil results of stooping or constrained postures during work. Perhaps, too, the well-known tendency to tubercular infiltration of parts of the lung confined by pleuritic adhesions, or consolidated by catarrhal pneumonia, may be due to the facility afforded for a prolonged lodgment of the bacillus, and the same may be said of hemorrhagic deposits in the lungs. In this case the organism would receive both board and lodging for a term sufficient, in many cases, for its development.

2. Another barrier to infection from the bacillus, even if it obtains a temporary lodgment, may be found in the vital processes carried on in the lungs. I am not aware of any direct experiments upon the action of nascent oxygen, or of ozone, upon the virulence of the bacillus; but my own experiments with the latter agent in fifteen cases of phthisis seem to show that it has a distinct influence in enabling the system to tolerate the presence of these organisms, and gain health and strength in spite of their continuance in the body. Moreover, the abundant records of the good effects of open-air life, and of free ventilation, seem to show that the disease cannot gain ground under these conditions. It seems highly probable that the bacillus of tubercle, though it may not be destroyed at once by these agents, yet is robbed of its power for evil by the same processes that Dr. Angus Smith and Pasteur have proved to take place in certain other organized ferments.

In any case, whether by simple oxidation, or by the energy of other vital actions—probably also, as Koch and others have shown, by the direct antagonism of phagocyte corpuscles —it is certain that the healthy human body has the power of disposing of a certain quantity of these creatures, even after they have been directly injected into the system.

3. There remains the question of dosage. Many of the facts ascertained, with regard to the spread of ordinary epidemic infectious diseases, seem to show that a certain concentration of the virus is necessary, before they can overcome the resistance opposed to them by the bulk of the population. The definite cyclical periods, observed by many of these disorders, render it highly probable that a certain density of the susceptible population must be attained before they can spread through large communities ("Epidemic Cycles," Proc. of Lit. and Phil. Society, Manchester).

The recent observations of Bollinger on this point, with reference to tubercle,[47] are of great interest.

He shows that very dilute solutions of sputum (1 in 100,000) and of cultures of bacilli (1 in 400,000) are virulent when injected into the peritoneum, but that much lesser dilutions were inoperative upon the intestine. In these researches the peritoneum remained sound in two-thirds of the cases, but the disease attacked the lymph-glands, the spleen, and the lungs. Incidentally it may be remarked that this observation shows

that lung-tuberculosis need not always depend upon inhalation, but may arise from virus that has been swallowed or injected.

But in addition to these evidences of varying susceptibility to the poison, Dr. Bollinger ascertained that while 800 bacilli, when injected into the peritoneum, are sufficient to cause the disease, smaller numbers than these become less and less certain in their operation.

We may gather from these facts the lesson, that up to a certain point the healthy body is able to destroy, or at least render innocuous, the organisms that gain access into its interior. There are probably great differences in this respect in different individuals, just as we know that some people seem to be quite proof against the infection of certain exanthemata, while they are especially prone to others.

It is worth noting that certain diseases, such as mitral stenosis and gout or lithiasis, are supposed to confer an immunity to the disease, but the explanation of this phenomenon is not yet clear. (Verneuil has only found two cases of phthisis associated with stone in the bladder, and finds upon inquiry that it is altogether exceptional ["Études," I., 229]. E. Solles ["Études," II., 95] regards erysipelas as also antagonistic.) The workers in copper are said to be more exempt than other people from phthisis, and Sir J. Simpson thought that the woollen manufacture conferred a certain degree of immunity upon the mill-hands of Yorkshire. These are some of the reasons for immunity.

Reasons for Infection.

It behooves us next to inquire whether there are any characteristics that make men unusually liable to contract tubercular disease.

It has long been assumed that there is a scrofulous diathesis or tuberculous constitution, and in 1860 Sir W. Jenner gave his classical description of the contrast between these two types of temperament. Since Galen also it has been supposed, that a peculiar form of configuration of the chest predisposed persons to contract the disease, a supposition advocated by Traube in Germany and by Dr. Gee in England.

I do not know how far these views are accepted at the pres-

ent day. It seems highly probable that a certain form of chest, with insufficient expansive and expulsive power, may afford opportunities for the deposit of the tubercle bacillus. But, on the other hand, I have seen men of the finest physique, and with magnificently-developed chests, fall victims to the disease. I apprehend that many of the cases recurring among Her Majesty's foot guards must have been of this description.

I. Hereditary Tendencies.

Few medical men who have been long in practice will doubt the existence of family predisposition to tubercular disease. Thus most of us have seen instances of families in which almost every member has died of the disease, and others in which members of the same family, living in different and sometimes far-distant places, have yet most of them ultimately succumbed to it. Yet it is quite possible to make too much of this influence.

When we consult the statistics that have been put together on the subject, we find great differences in the results given by different observers.

Thus Briquet found that one-third of the consumptive patients at a hospital were born of consumptive parents on one side or the other; Dr. Quain, 25 per cent; Dr. J. Pollock, 30 per cent; Dr. C. T. Williams, 12 per cent of direct influence, and 48 per cent of family predisposition. Rilliet and Barthez found that one in seven of tuberculous children had some hereditary taint; Mr. Phillips only 4 per cent, Lebert three-fifths. Lugol states that more than half the subjects of scrofula have consumptive progenitors. Francis Galton [48] gives 26 per cent of consumptive children by one method of calculation, and 28 by another. But in these figures no account is taken of the influence of external circumstances—sources of infection from without that are common to all the members of the family.

Again, there are so many deaths from phthisis in the country—nearly half of all the deaths between the marriageable ages, from fifteen to thirty-five, are due to this cause—and hence without any such thing as hereditary taint, there would be nothing surprising in the fact that half of the consumptive patients have had consumptive relatives, unless the

families were unusually large, and if we draw grandparents and collateral relatives into the statistical net, it breaks at once and holds no solid conclusion.

Dr. Walshe (the chief authority on chest diseases in this country) obtained from his hospital patients the result that about 26 per cent came of father or mother, or of both parents similarly diseased; but in discussing the significance of these figures, he asks whether they prove the reality of hereditary influence, and decides that they do not. "This ratio," he says, "of 26 per cent might be, and probably is, no higher than that of the tuberculized portion of the population generally," and he concludes that "much phthisis is, in each generation, non-hereditary."

It is, moreover, highly probable that heredity has much less to do with consumption than is commonly supposed. A very large proportion of cases arise without any phthisical family history of the past. Many healthy families leaving the country and coming to reside in crowded towns, lose some members subsequently from consumption. In the army more than 60 per cent of cases are non-hereditary.

It will thus be seen that, although we cannot say with Louis,[49] "Nous n'avons recueilli aucun fait en faveur de l'hérédité de la phthisie," yet we must ascribe to it a much smaller influence than is usually given.

Granting also the real influence of heredity in predisposing to tubercle, there are at least three distinct modes in which it may be exerted. 1. By the direct infection of a child with the disease in an active state. 2. By the implantation of the organism or of its spores, which may remain for a period latent in the system. 3. By the transmission of a constitution peculiarly open to attack by the bacillus—in other words, an undue vulnerability of the system.

It is possible that each of these circumstances may occur. 1. We occasionally see cases of undoubted congenital tuberculosis, and the researches of Landouzy and Martin, of Lannelongue and of Niepce,[50] show clearly the possibility of this event.

The first-named authors show (pp. 59-74) the tuberculizing power of the seminal fluid of tuberculous Guinea-pigs. Niepce found bacilli in the semen of tuberculous individuals, and Lannelongue declares in favor of the doctrine of intra-uterine infec-

tion of the fœtus (p. 97), citing in support the aforesaid researches, and the observations of Demme, who found in two infants, one of whom died on the twenty-first day after birth, an intestinal tuberculosis, and the other at the twenty-ninth day, a pulmonary tuberculosis with an advanced cavity in the lung. He opposes these facts to the assertions of Leudet, who had never seen a case of fœtal or congenital tuberculosis, whether hereditary or acquired; of Vallin, who speaks of it as so rare as not to be worth notice; and of Professor Peters, who declares roundly that "on ne naît pas tuberculeux mais tuberculizable" (p. 94). Bollinger[51] says: "Die sogenannte congenitale Tuberculose so gut wie auszuschliessen ist." (An interesting fact in relation to this point is given by M. Duprey, that in a flock of merinos, a phthisical ram produced from sixteen to twenty tuberculous sheep.—"Traité de l'Affection Tuberculeuse chez les Animaux," Paris, 1817.)

2. Lannelongue ascribes the rarity of early tuberculous infection to the conditions of resistance in the bodies of infants and children, which may have the power of keeping the virus in a latent state, and which may even prevent its development altogether.

Baumgarten[52] goes much farther than this, and boldly says that "tuberculosis may remain latent, under certain circumstances, during the whole of life, without interfering with living functions in any observable degree." Nay more, he believes that it may pass through a generation and be transferred from grandparents to grandchildren. He places it in the same category with syphilis and leprosy, and ascribes the greater part of the tuberculosis in the world to this hereditary descent.

He defends this thesis by an appeal to the experiments already quoted by Landouzy and Martin, Queyrat and Lannelongue,[53] and cites in its favor not only his own researches, but those of Marchand,[54] of Bollinger (Gosselin, "Études sur la Tuberculose," Verneuil, p. 34, also gives instances in which iodoform seemed to render sterile the thousands of bacilli injected into rabbits; but he remarks that it seems impossible that they can remain inactive for several months and then revive), and other pathologists, though, as we have seen, Bollinger is certainly not on his side. He also endeavors to show the inadequacy of other explanations, such as infection by the air, by food, etc.

But, with all respect to so able a pathologist, I must say that Professor Baumgarten has failed to convince me of the truth of his theory.

There is no direct proof that the virulence of the bacillus can remain latent for more than a few months. The heredity of leprosy is still unproved, and even if the evidence in its favor were stronger, the nature of the hereditary tendency to contract it is as uncertain as is that to tuberculosis.

The analogy of syphilis with tuberculosis is also not yet made out, and the character of its latency is still *sub judice.* Dr. Baumgarten also surely underestimates the great weight of the evidence that connects phthisis with the inhalation of impure air, and with in-door occupations. On these grounds, therefore, we certainly ought to hesitate before accepting the fatalistic doctrine of the inevitable nature of inherited tuberculosis.

3. The last-named form of hereditary influence is probably the most common.

We know that a tendency to contract other diseases than phthisis is not infrequently transmitted from parents to children. Our own royal family have shown a peculiar proclivity to both typhoid fever and diphtheria, and a similar predisposition to contract these diseases occurs in other families. I know, for instance, of one family in which six out of eleven children have died of diphtheria, and other members of the family have suffered from, but have survived, this complaint. They were not all of them struck down at the same time, or by the same epidemic; but three children died in South America, one in the South of England, and two in the place where they are now residing. Such a fatality as this from a particular disease displays a strong family predisposition both to contract the disease and to succumb to its attack.

Much the same must be said of a hereditary tendency to consumption; but there is no more need to assume the existence of a tubercular constitution than of a diphtheritic or typhoid diathesis.

Villemin distinctly repels the idea of the existence of such a constitution, and says of heredity that "the sole influence it exerts is in the transmission of an aptitude to contract the disease."

Niemeyer says: "I do not hesitate to say, in spite of all

assertions to the contrary, that it is by no means proved that tuberculosis, in the strictest sense, is an inheritable disease;"[55] and again: "Quite as decidedly as we have opposed the evidence that tuberculosis is inheritable, must we pronounce in favor of a frequent occurrence of an inherited disposition to pulmonary phthisis" (p. 20).

I admit the existence of hereditary predisposition to tubercle, but I do not attribute to it a great importance; and, if we set aside the few congenital cases of the disease, I believe that the transmission of an aptitude to contract it, does not necessarily lead to the disease itself—if care is taken to avoid the sources of external infection. In short, I am inclined to agree with Louis when he declares that "few persons are born necessarily to die of consumption."

II. Age, Sex, and Race.

Somewhat similar remarks must be made with respect to the influence of age, sex, and race upon the tendency to contract the disease. We have already seen that, up to the age of puberty, the mortality from phthisis is comparatively small; but after this age the younger residents in an infected house are always the first to succumb to the disease.

This fact comes out in many of the returns obtained by the Collective Investigation Committee of the British Medical Association. In several of the cases of the almost wholesale destruction of a family residing in one house, the older members, the father and mother, escape the disease.

Sex seems to have only slight influence—it is at any rate as nothing against the overpowering presence of such circumstances as in-door employment, unhealthy trades, etc.

All races also, as we have seen, suffer more or less from the disease, though it is acknowledged that the negro, as well as the monkey, suffers grievously when transplanted from his own land. (It must be pointed out, however, that in most cases he is lodged amid most unhealthy conditions when he is thus brought over.)

III. The Influence of Previous Diseases, either General Diseases of the Body or Local Diseases of the Lungs Themselves.

It is well known that certain disorders, such as enteric fever and measles and small-pox, especially after an imperfect recovery, often leave behind them a serious tendency to tubercular disease. This tendency may be due simply to their debilitating influence, or more frequently to the fact that by reason of the lesions of surface that have taken place in the course of these diseases, a portal has been opened through which the bacillus of tubercle can enter.

Over-lactation, frequent pregnancies, diabetes, and other debilitating disorders are probably predisposing causes, as rendering the system less able to destroy the organisms that accidentally make their way into the system. But it is to previous affections of the lungs that we must look as the most common causes of bodily predisposition.

Most phthisical subjects refer the onset of their disease to a "chill," or to a "neglected cold," and some observers, such as Dittrich, Niemeyer, and Buhl, went so far as to ascribe nearly all cases of tuberculosis to "catarrhal pneumonia," a disease which was supposed to be the main source of the caseating masses found in phthisical lungs after death. In this opinion they were followed by many other pathologists. Recent researches have, indeed, proved the erroneous nature of these conclusions, and have established Laennec's doctrine that these masses are themselves truly the result of tuberculosis, but they have not affected the observation that many cases of phthisis are preceded by purely inflammatory diseases of the lungs, such as pleurisy, acute bronchitis, broncho-pneumonia, and imperfect resolution of ordinary pneumonic inflammation. ("In my experience croupous pneumonia is the commonest form which produces a fibroid change. The unabsorbed residue sets up an irritation, which is followed by increase of the normal fibrous tissue until large bands of this are seen in parts of the lungs; the process is a very chronic one, and is generally associated with much pigmentation and anthracosis. In these cases—at any rate in some of them—the consolidated material after a time

caseates and breaks down, and in this can be found the tubercle bacilli. I have noticed one peculiarity in connection with this disease, that is the formation of large giant cells at the edges of the consolidation, together with fibroid tissue resembling tubercles. This was of quite recent date and probably corresponded to the breaking down of the consolidation. In miner's and other kinds of phthisis, caused by long-continued irritation, the process is essentially the same; it results in the formation of dense fibrous tissue. The breaking down in these cases seems to be independent of the original disease." Gibbes and Shurley, "Etiology of Phthisis," "American Jour. of Med. Science," March, 1890.)

It is not difficult to understand why these diseases should prepare the way for the entrance of the tubercular virus. We have seen the nature of the safeguards against infection that exist in healthy lungs; but in acute bronchitis one of the earliest changes is the detachment of the ciliated epithelium of the affected bronchi, and this remains absent during the course of the disease. It is true that there is also, usually, an abundant proliferation of epithelium and of mucous fluid from the mucous glands, and that this may, and generally does, arrest the progress of infection; but any germs that escape this trap will probably find their further progress facilitated by these changes. Koch ascribes the tuberculosis following measles to this source.

Even in chronic bronchitis, after a time, the expulsive machinery may become defective, the waving cilia may become less active, the muscular apparatus of the tubes may be weakened, and dilatation and plugging of the air-passages may occur; thus the bacillus may find a lodgment within the lungs, and true tubercular disease may be set up. This specific infection is again still more likely to take place if, from any cause, the ultimate tissues become inflamed, as in the various forms of catarrhal pneumonia or broncho-pneumonia. The lung loses its elasticity, its tissues are more open to infection, the residual air becomes stagnant, and its impurities, including foreign germs, are liable to be imprisoned for an indefinite time.

But that there is no necessary connection between ordinary diseases of the respiratory organs and phthisis may be shown by comparing the rates of mortality of these two

classes of disease. I have here a chart (see p. 205), drawn from Lowe's tables, from male populations at identically the same ages (*i.e.*, from fifteen to fifty-five), from which it may be seen that the height of the line, indicating the prevalence of ordinary lung diseases, bears no direct relation to the prevalence of consumption. It is true that both Liverpool and Manchester are severely visited by both types of disease, but on each side of them stand many places in which there is no such correspondence to be seen.

Modes of Infection by the Tubercle Bacillus.

From what has already been said, it will have become abundantly evident that although we have not prejudged the question of contagion, yet that we regard tuberculosis as an infective disease, mainly deriving its origin from without the body, and that, in searching for its mode of entrance into the human frame, we must examine all the possible portals through which it can pass.

Now, there are four possible modes of access to the interior of the body: the skin, the generative organs, the digestive tract, and the lungs.

The first two are, I believe, comparatively rare sources of infection.

Tuberculosis is, indeed, inoculable by the skin, and there are on record cases in which it has thus been accidentally contracted. For instance, in Verneuil's "Études sur la Tuberculose" (Paris, 1887) there are several such cases given, but the local disease did not spread to internal organs.

Cases of such generalization of the virus are, indeed, occasionally heard of; thus, in the prospectus of the congress held in Paris in 1888, reference is made to an experiment of Villemin's in 1869, in which a cutaneous surface, denuded by means of a blister, and powdered over with dried and pulverized tuberculous sputum, gave rise to general tuberculosis, and again, in the discussion held at the Academy of Medicine in Paris (December 3d, 1889), on prophylaxis against tubercle, Monsieur Nocard cited the case of a certain veterinary surgeon, named Moses, who was wounded in the hand during the examination of the body of a tuberculous cow, and who at first had cutaneous tubercles on the cicatrix, and afterward

developed symptoms of phthisis, of which disease he died two years later.

These exceptional cases, however, only serve to show the rarity of the occurrence.

The most common mode of origin of scrofulous lymphatic glands is well known to be some previous lesion of the skin or mucous membrane, through which the virus has made its entrance. But, usually, the disease is arrested by the suppuration of the gland. Lupus, also, which is now generally acknowledged to be a tuberculosis of the skin, does not usually spread to the general system. On the whole, then, I believe that infection of general tuberculosis by the skin is a comparatively rare event.

Infection by means of marital intercourse is also probably very uncommon. It is impossible to say that it may not occasionally take place, especially in view of the observations of the French pathologists, which have already been quoted, as to the presence of the specific bacillus in the generative organs and in the semen.

Food.

In former times the discussion of the question of the production of tuberculosis by food was limited to the subject of the adequacy of certain foods, and the quantity required to sustain the bodily vigor to such an extent as to prevent the tubercular diathesis, as it was called. But so soon as tuberculosis was recognized as an infective disease, experiments were made that proved the possibility of the entrance of the disease through the digestive tract. Both Villemin and Chauveau succeeded in producing tuberculosis by feeding animals with tuberculous material, and their researches have been confirmed by others, notably by Von Wesener. The question as to the suitability for food of the flesh of tuberculous animals is undoubtedly one of enormous importance. It has been stated (Dr. Behrend) that as much as 80 per cent of the meat sent to the London markets came from such animals (this must be an exaggeration, as the Departmental Committee on Tuberculosis in 1888 reported to the Privy Council that the proportion of tubercular disease among cattle slaughtered varies from 0.09 per cent at Edinburgh to 50 per cent—Quest. 4,304), and in many places the prevalence of the disease among

cattle has been found to be so great that it has been proposed, and in some places it has actually been decided, to place an absolute veto upon its sale.

Extreme differences of opinion, however, prevail as to the necessity for so greatly restricting the supply of animal food.

On the one hand, at the Congress on Tuberculosis, held in Paris in July, 1888, M. Nocard urged that if any animal presented signs of tubercle in any organ, howsoever localized, it should at once be rejected as unfit for food, and he was followed by other speakers on the same side, with the result that a resolution was passed by the congress that "all meat derived from tubercular animals, whatever the gravity of the specific lesions found in them, should be seized and totally destroyed."

Dr. Behrend, in a paper in the "Nineteenth Century" review for September, 1889, strongly supports this view, and quotes Dr. Klein in its favor, and ascribes the supposed immunity from tubercle enjoyed by the Jews to their careful selection of animals for food. (We have already seen that such immunity is by no means general.) This view also is not without some experimental evidence on its side, though Dr. Behrend does not mention it, for in Wesener's experiments swine and rabbits became, several of them, affected with tubercle, after being fed with the raw flesh of tuberculous cattle. Cooking, however, destroyed the virus, and dogs were unaffected.

Toussaint also succeeded in producing the disease by inoculating the juice from the flesh of a tuberculous pig. On the other hand, Kastner,[56] after adopting most rigorous antiseptic precautions, injected the juice from the flesh of twelve beasts, in all stages of tuberculosis, into the peritoneal cavities of sixteen Guinea-pigs, with absolutely negative results. My friend, Dr. Dreschfeld, of Manchester, has made similar experiments with juice from the flesh of six cows, five of them in an early stage of tubercular disease, and one in an advanced form, though no tubercles were found in the flesh. The results from the first-mentioned group were entirely negative, the rabbits injected remaining perfectly healthy; but the juice from the flesh of the cow in a more advanced stage of the disease produced a small crop of tubercles at the place of puncture into the abdominal cavity of two rabbits after the

lapse of from three to five weeks, and material from this tubercular growth injected into another rabbit again gave rise to still more decided tubercle. (Since this was written, these observations have been extended to ten cows in all; of these, six have now given negative results, three, in which the flesh was in an obviously unhealthy condition, have produced tuberculosis, and one, the flesh of which was apparently healthy, caused the disease after a lapse of three months.)

The evidence as to the transmissibility of tubercle by the ingestion of milk from tuberculous animals is much more distinct and positive as to its occurrence, even when there was no general infection in these beasts; and when we consider the enormous amount of mesenteric and visceral disease that exists at the present day among young children, it becomes a matter of extreme importance to the state that the bearing of this evidence should be made widely known, and that it should be followed by measures directed to avert the evil.

In the Registrar-General's Report for 1888, the deaths of 3,659 males and 3,115 females are ascribed to tabes mesenterica, and 3,722 males and 3,021 females to tubercular meningitis. Hirschberger declares that 25 per cent of all children dying under one year of age die of tuberculosis.

It is assumed that many of these cases are directly the result of intestinal infection by the bacillus.

Bacilli have been found by Bang[57] in milk, both when the udders of the tuberculous cows were affected and when they were not, and he obtained constantly positive results by feeding with the former, and occasionally with the latter, and he found that heating the milk to 70° C. did not always destroy its virulence. Only boiling would entirely do so.

Ferdinand May and Gottlieb Stein have made similar observations; but these researches are open to objection, on the ground that tuberculous material may have entered the milk from without; and, on the other hand, the digestive juices may act destructively on the infection when it is actually present.

On these grounds Dr. Hirschberger, under the guidance of Professor Bollinger, instituted a series of experiments in which extreme care was taken to avoid these possible sources of error. The milk was obtained in two ways: 1, by milking into glass vessels, sterilized by heat; 2, by drawing it directly

from the udders of recently-slaughtered beasts, antiseptic precautions being strictly observed. Guinea-pigs were the experimental animals employed, and the milk was injected into the free peritoneal cavity. The animals were always young and fresh on the market, and they were kept under excellent hygienic conditions. A very large number of the animals contracted tubercle, even when, as in these cases, the udder itself was unaffected, and although, out of twenty udders used, in only one was the presence of bacilli demonstrated by the microscope.

In only six cases was no infection obtained, and even when the cows were in otherwise good condition, which seven of them were, positive results were obtained in three cases.

He concludes from his researches that there is great danger attending the consumption of milk from tuberculous animals, in whatever condition they may be, and whether or not the disease is localized only.

Other observers, such as Von Wesener, Fischer, Baumgarten, Bollinger, Johne, and Martin and Queyrat, have also investigated the subject, and although they differ somewhat as to the exact track of the disease, they agree on the whole in regarding as dangerous the use of the milk of cows who are tuberculous, even when they only have the "pearl disease." Fischer and Baumgarten have shown, morever, that the tubercle bacilli are not deprived of their power for evil by the action of gastic juice, and Dr. Behrend quotes MM. Strauss and Wurtz as coming to a similar conclusion.

In the presence of facts such as these, we cannot deny the possibility of the transmission of tubercle by means of the flesh of cattle, and it is highly probable that mesenteric and intestinal disease is not infrequently produced, especially in children, by the use of infected milk; but there are certain broad considerations that should, I think, prevent us from attributing much of the phthisis that prevails to either source of infection, and this in spite of Bollinger's observation that the lung may become affected even when the tuberculous matter is introduced by the intestinal canal or the peritoneum. Thus we do not find that the classes who eat most meat are those who are most commonly attacked by phthisis. Among our poor phthisical patients, how many there are who do not taste butcher's meat from year's end to year's end, and again,

when the lower orders are able to procure this luxury, it is well known that they prefer it over-cooked rather than underdone; and the persons who, as we know, are the most subject to tapeworm, from picking at raw meat—namely, butchers and cooks—are far less liable to phthisis than other classes of the community.

It would be interesting also to know how those who ascribe such dire results to the eating of the flesh of oxen would account for the fact that in India, the Hindoos, who abjure such meat, are as subject to phthisis as the other races (Lombard, "Climatologie Médicale," IV., 417: "L'on voit dans les hôpitaux de Calcutta des phthisiques européens, hindous, mahométans et juifs." I have already pointed out the tendency of the Jews of Alexandria to contract the disease. See Virchow's "Archiv," 1883 or 1884. Schottelius), and also why the Gauchos of South America, who subsist almost entirely upon beef, are so remarkably free from the disease. Dr. Thorburn, of Toronto, tells me that the North American Indians, who now get no meat, are terribly subject to consumption.

Somewhat similar remarks apply to the use of milk, for the poor denizens of our towns, among whom phthisis and mesenteric disease are most common, are often unable to procure milk; but it must be acknowledged that when they do obtain it, it is more likely to be obtained from diseased animals, and also more open to contamination by tuberculous dust in the small milk-shops in which it is stored. Still the comparative rarity of the disease among the children of the rich, who consume it largely, and who very seldom will take it after it has been boiled, shows that the danger from this source is not quite so serious as it has lately been represented to be, both in this country and on the Continent.

The measures to be taken for averting the danger will be indicated in the next chapter.

The Atmosphere.

The next medium through which the bacilli may be conveyed is the air.

We have already seen the close connection that exists between foul air and tubercular lung disease, and we have studied some of the circumstances in which the bacilli may

find a resting-place in the lungs, and under which they may develop into true tuberculosis.

But we have not yet determined the exact nature of the media through which these organisms are conveyed into the lungs—1, whether it comes directly from mouth to mouth, or, 2, whether it comes indirectly from the sputum of phthisical persons—dried up, for the most part, and flying about in the air of dirty rooms or crowded assemblies in the form of dust. And the further questions arise whether the bacillus is kept alive, or its virulence increased, outside the body, either by the presence of aqueous vapor, or by emanations from the soil, or by other organic impurities connected with certain localities or certain dwellings.

1. Direct contagion—from mouth to mouth. In discussing the communicability of phthisis there has been a want of precision in putting the question as to whether direct or indirect contagion has in certain cases caused the disease. There can be little doubt, however, that, in the minds of most of those to whom the question has been put, it was the first or direct form in which it has presented itself.

The word contagion implies transmission by contact, and in the case of phthisis it would naturally be taken to mean the direct transference of the disease from person to person —in the words of Timon of Athens that "Breath infects breath."[58]

That contagion from a consumptive patient is a possible event, is an opinion that has been held by many eminent men —Morgagni, Van Swieten, Valsalva, Morton, and Baumé among the ancients; Laennec, Copland, Bowditch, Dr. Wm. Budd, Dr. Gueneau de Mussy, and Dr. Hermann Weber in more modern times. All these observers have expressed their view that the disease is contagious; and although there are many others on the opposite side, affirmative evidence is, in this case, of more value than negative. In Italy and Spain, as is well known, the disease is treated as contagious, and after death the bedding is destroyed and the dwelling thoroughly fumigated and cleansed; quite recently, too, a number of supposed cases of contagion have been contributed by medical men to the Collective Committee of the British Medical Association; and on the first perusal of the "Collective Investigation Record," it would seem to be impossible to doubt

that, although the contingency may be a rare one, the possibility of such direct infection has been proved. I have myself shown, however, that the importance of these cases is liable to be exaggerated, and that they afford but little certain proof of the direct contagiousness of phthisis. In a paper on "The Limits of the Infectiveness of Tubercle," I have pointed out that when checked by means of Dr. Longstaff's formula, supplied by the committee themselves—the number of cases of phthisis in husband and wife, supposed to be due to contagion, is less than it would have been, had only accidental and non-contagious cases been admitted into the record.

Moreover, we have to take into account the possibility of contagion by sexual intercourse (it may perhaps be regarded as favorable to this view, that in 188 cases reported to the Collective Investigation Committee, 119 are of supposed transmission from husband to wife, and only 69 from wife to husband [Report, p. 33], and Dr. Weber's experience is to the same effect); and the certainty that, in most of the cases of supposed direct infection, all the persons whose cases are noted were exposed to the same risks arising from unhealthy environment; and again, if phthisis were directly contagious, it is remarkable that it should be chiefly contagious in badly-ventilated houses, and on certain soils; and it is further difficult to see why drainage of the land, and elevation above the sea-level, should in any way affect its contagiousness. Even good ventilation could hardly prevent a husband and wife, or other bed-fellows, from communicating the disease, and yet such an occurrence has rarely, if ever, taken place in well-ventilated houses. In the Report of the Collective Investigation Committee, Dr. Dewar, of Arbroath, makes the significant remark, that in all his cases of supposed infection (No. 166), "the patients lived in small, confined houses, and slept in the 'box-beds' in use in Scotland." "During twenty-five years," he says, "I have not seen one case of contagion in the airy houses of the well-to-do."

It is worthy of note that most of the physicians who have had the widest experience of phthisis are non-contagionists; thus Dr. C. T. Williams pronounces strongly against it, and gives statistics from the Brompton Hospital which are entirely opposed to the theory of contagion.

Dr. Pollock also says:[59] "It can be shown that after an experience of thirty-six years, during which the hospital has been established, not only has no infecting process been evidenced, but that the medical officers and nursing staff, and the officials and servants, have been unusually free from phthisis."

Dr. Andrews does the same from the city of London Hospital for Diseases of the Chest, and in his Lumleian Lectures for 1884 adduces several of the considerations against the theory, which had already occurred to myself before seeing his lectures. He concludes that "there is not sufficient evidence to prove that the prevalence of phthisis is especially affected by direct contagion."

Dr. Bennet, after twenty-five years' experience, says[60] that "if there has been any spread of phthisis at all by means of contagion, it has occurred very seldom, and only in quite exceptional circumstances." In his summing up of the evidence on this point, Hirsch remarks[61] that "contagious transmission of phthisis plays but a subordinate part in the spread of the malady."

Baumgarten says:[62] "Der Ursprung durch Inhalation, als Regel in hohem Grade unwahrscheinlich erachtet werden müsste." Ricochon[63] answers the question, "Can contagion arise directly by respired air?" by saying that "experience is not favorable to this idea." Verchère[64] holds the same opinion, and many other quotations of a similar import could be brought forward. (Francis Galton, "Natural Inheritance," p. 180, points out that, among the families from which his statistics were derived, only eight of the consumptive fathers had tuberculous children, and sixteen of the mothers; and he remarks: "So far as it is contagious or infectious, we must recollect that the child is peculiarly exposed during all the time of its existence before birth to contagion from its mother. During infancy it lies in her arms and afterward lives much by her side, closely caressed, and breathing the tainted air of her sheltered rooms." The explanation of the fact that we have been discussing appears, therefore, to be summed up in the single word "infection." But this does not exclude indirect infection from dust.)

2. As to the dissemination of phthisis by means of dust, it is well known that Koch regards this as the most common way in which it is produced—by the drying up and pulveriza-

tion of matter expectorated upon the ground, or on the floors of dwellings, or on handkerchiefs.

Cornet [65] has also warmly taken up this view, and by a series of experiments upon animals has proved the infectious qualities of dust obtained from the walls in the immediate neighborhood of phthisical patients. In one case this dust produced tuberculosis, when removed from the wall of a room, six weeks after the death of the consumptive woman who had lived in it. In another, a room at an hotel was proved to be thus infected, and he points out the danger of infection from matter expectorated on the ground, or into handkerchiefs, and even from the dust of books in lending libraries.

Long before the discovery of the bacillus of tubercle also, this view was taken by some of the most competent observers; thus, Dr. Farr, in his Report to the Army Commission, remarked that "the prevalence of phthisis in the armies of Europe is probably due, in part, to the inhalation of expectorated tubercular matter, dried, broken up into dust, and floating in the air of close barracks."

Mr. Welch, in his prize essay "On the Nature and Varieties of Destructive Lung Disease among Soldiers," says: "The chief deleterious agent in the generation of consumption is the organic matter, which, taken into the air-passages, there lodges and chronically irritates."

Dr. Parkes apparently held the same view, for he speaks of "phthisis and other lung affections, which may reasonably be believed to have their origin in the constant breathing of air vitiated by the organic vapors and particles arising from the person." [66]

I have ventured to ascribe most of the cases mentioned in my paper on "Tubercular Infective Areas," and especially the double and treble occurrence of the disease in the same houses, to this source of infection.

The retention of the bacillus either in dust, or in the vapor of the air, would fully account for the most of the cases of supposed direct infection recorded by the Collective Investigation Committee, and especially for those in which the virus appeared to be introduced from without into houses previously entirely free from the disease.[67] It accounts fully for all the additional cases mentioned by Dr. Burney Yeo, in his able defence of the doctrine of contagion in the "British Medical Journal" [67] (April 18th, 1885.)

The following case recorded by Dr. Niven would also come into the same category:[68] "A married woman from Oldham, went with two children (one a lad æt. 10) to Southport, to join her husband, in September, 1887. The husband, wife, and the two children all slept in one front room. In the same house was a woman suffering from consumption, which was said to have been contracted from her husband, who had previously died of the same disease. (This woman is since dead.) As the weather got colder, this consumptive woman asked them to change rooms with her, as her bedroom was colder than theirs. This was done. The Oldham woman used to complain of a peculiar odor in the room; it does not seem to have had any special cleansing or disinfection. In January, 1888, the lad, æt. 10, died of "inflammation of the brain;" he had been ill a month. From the history, his fatal malady was almost certainly tubercular meningitis. The Oldham woman became *enceinte* in Southport, but removed shortly afterward to Oldham, and was there confined in June, 1888, but before the birth of the baby, she lost flesh, and showed the first symptoms of phthisis. The baby died in June, 1889, of tabes mesenterica, and she died in October of phthisis."

The terrible mortality from phthisis that has been observed in convents is most probably to be accounted for by the combination of bad ventilation, and want of perfect cleanliness and of care in the removal of sputum-laden dust.

Laennec himself, in his classical work on phthisis pulmonalis, gives an instance of this in a religious community of women kept in strict seclusion and with sombre surroundings, among whom he had seen consumption arise so frequently, that in ten years' time the population of the institution had been two or three times renewed, owing to the mortality of the inmates, with the significant exception of those who had charge of the gardens, the kitchens, and the infirmary.

(The following case is given by Dr. Beddoes in his "Hygeia," upon the authority of Dr. Luzuriaga: "A nun died at Bilboa of consumption; the furniture was burned, the walls, ceiling, and door washed, the floor taken up and sand laid in its place. The cell was then tenanted by another nun, in perfect health and of an excellent constitution. In two months she began to decline, her flesh wasted, the chest

was attacked, the cough became worse and worse—in short, she died consumptive in eight months after taking possession of the cell. General purification as before. A third healthy nun succeeded and died in the course of a year. New examinations took place, and it appeared that the cord near the bed, attached to the dropping-bolt of the door, had not been removed. This, it was said, was impregnated with the sweat of the patients and with other noxious exhalations. It was removed, new furniture introduced, and a fourth nun has lived in the same cell for five years."—Essay VII., p. 95. The "London Medical Record" for July, 1884, quotes a similar case by Dr. Kempf, of Louisville.)

But the most striking series of statistics on this point is given by Dr. Cornet,[69] who, by an elaborate statistical inquiry into the mortality from phthisis among the Catholic nursing orders in Germany, shows that the deaths from tuberculosis form nearly two-thirds of the total deaths, and in half the returns this proportion was exceeded, and in some mounts up to three-fourths. In two small mother-houses every death was put down to tuberculosis. Dr. Cornet ascribes this fearful mortality to infection from dried-up sputum.

3. We have now reached, perhaps, the most difficult part of our inquiry—as to whether any conditions outside the mere presence of the bacillus are necessary, or at any rate auxiliary, to its infective power.

We still need an explanation of the facts: (*a*) that free ventilation is antagonistic to its influence, and that, under this condition, it does not spread from person to person under circumstances of the closest possible personal contact.

(*b*) That its prevalence is greatly affected by a certain elevation of the site of dwellings.

(*c*) That it is more deadly and rapid in its action in hot, damp climates, and less common in cold and dry countries.

(*d*) That dampness of the subsoil under dwellings has a distinctly favorable influence in promoting its attacks.

(*a*) With regard to the influence of free ventilation, it is not only possible, but highly probable, that in many of the places where its good effects had been observed, other conditions as well have come into operation, and especially greater cleanliness and more complete removal of dust and other refuse.

Where people care for fresh air, they also frequently show a preference for cleanly surroundings, both of house and clothes and person.

It is true that this consideration is not universally applicable: there are many very dirty dwellings that are well ventilated, as in the wattled huts of the Labrador fishermen, or the loosely-constructed dwellings of the island of St. Kilda, and yet the inhabitants are almost exempt from the disease; but in these cases, apart from any disinfecting action of the air, or peat smoke, it is open to us to suppose that a good deal of the infective dust is swept away by the currents of air.

It may thus be possible to account for the absence of indirect infection through the medium of dust, in these places; though, as I have before remarked, it will not explain the non-occurrence of direct mouth-to-mouth infection, which may therefore be considered as rarely, if ever, operative.

(*b*) Somewhat similar remarks may apply to the influence of an elevated site upon even indirect infection through dust, for in these situations we probably have both more movement of air and less dust. We may also suppose that the health-giving properties of such sites would give to the dwellers upon them more power to withstand the bacillus, so that they could take in with impunity larger doses of these infective organisms.

In most cases, too, the rocks, or the subsoil, on which the houses stand, would supply to their inmates a purer and less vaporous ground-air than in less elevated regions.

(*c*) But no such explanations as these will touch the remaining two points that we have to consider. If there is no condition outside the body that influences the viability or virulence of the bacillus, it is very difficult to account for the comparative immunity of frosty or sub-arctic regions, and for the intensity of the tubercular action in hot or tropical climates. It is certain that chronic inflammations of the lungs are not more common in the latter, and thus one source of disease is not so frequently present, while in the cold regions, where these affections are rife, phthisis is comparatively rare, and much less virulent.

We have no reason to suppose that bacillus-laden dust is absent in the crowded towns and close rooms which are to be found in Canada, for instance, and yet the disease does not

spread as it does in the warmer and more genial air of Italy and the tropics.

(*d*) Again, it affords no explanation of the influence upon such infection of damp or undrained subsoils. Nor yet of the improvement in the phthisis-rate that has been shown to follow thorough drainage of a town.

As Dr. Andrew points out,[70] "It is difficult to understand in what way the drying of the soil . . . could have so profoundly and so rapidly altered the constitution, habits, and vitality of the people of Salisbury, for instance, and of other towns, as at once to reduce, by a very large percentage, the number of cases of a developmental, or directly contagious, disease."

To account for these several points, it is necessary to assume the existence of some conditions accessory to infection by the bacillus, which shall either enable it to live longer outside the body, or which may even increase its power of attack.

It may, indeed, be sufficient to account for the facts, if we assume the first of these hypotheses to be true, and if it could be proved that a hot climate, and a damp soil, give a longer term of life to the bacilli contained in foul and dusty air, for this circumstance would increase the probability that some of these organisms would find a suitable host; but I am inclined to think that something more than this is necessary, to account for the difference in intensity of bacillary infection in pure air, and that reeking with organic vapors.

I have, therefore, ventured to suggest that the tubercle bacillus, like some other infective microzymes, may actually increase in virulence during a sojourn for a time in some medium external to the body—either in polluted ground-air, or in an atmosphere saturated with aqueous vapor from the lungs.

There is nothing in the natural history of such organisms that need run counter to this theory, and as it has been shown by Dr. Thiersch and Professor Burdon-Sanderson, that the intensity of the poisons of cholera and enteric fever increases after their extrusion from the body, so it may be possible that contact with a certain kind of organic matter may assist the sporulation of the bacillus of tubercle, and render it more infective after a time, than at the moment of its exit from the lungs of a phthisical patient.

I do not know whether the same observation has been

made by other physicians to consumptive hospitals, but it has certainly struck me that a fresh infection of the lung, in persons already suffering from phthisis, is much more likely to take place from without, than from within the body. Many times have I seen in-patients with sputum teeming with bacilli, improve in health, gain weight, and almost lose the physical signs of their disease, and then they have returned home and in a few weeks they have come back to the hospital, sometimes with fresh disease in the damaged lung, sometimes in the opposite lung that had been previously healthy, and sometimes with laryngeal phthisis.

Such facts as these certainly seem to show that there was something in the air of their own homes much more infective than the bacilli of which they were themselves the hosts. The one fact that might seem to bear against this theory is the high temperature required for the development of the organism. And the greater virulence of the disease in hot climates probably shows the influence of this condition, but it is by no means proved that, in cold climates, the bacilli contained in damp and foul dwellings may not in some way increase their power for evil. (On this point Dr. Candler remarks: "I demur to the somewhat authoritatively pronounced dictum that it follows that the bacillus is a pure parasite from the one fact that it could not be got to grow outside the organism, except at blood-heat. The inference is by no means an inevitable sequence from the fact, for the fact does not take in enough to found such a weighty conclusion upon.

"It simply amounts to this—that the development process of the bacillus did not occur at ordinary temperatures during the highly-artificial cultivations required in Koch's investigation. And one has to suppose, from the inference drawn from it, that this fact was regarded as equivalent to proof that the bacillus cannot be cultivated at ordinary temperatures under any conceivable artificial conditions. It would seem to have been assumed that because it did not grow in one series of experiments it was a certainty that it would not grow in any other series. But, as all possible combinations of soils and conditions were not exhausted in Koch's research, who shall say that some other investigator, or Koch himself, may not yet successfully cultivate this bacillus at ordinary temperatures?

"Again, even if it be granted that it shall be found impossible within the next ten or twenty years to cultivate the bacillus below blood-heat, it would not follow of necessity that there might not be an undiscovered means of growing it, as any one who knows the history of the common yeast-form will readily apprehend. Moreover, if this bacillus should defy the efforts of man during all time to cultivate it below blood-heat, he may nevertheless have been contributing, undesignedly, to its growth, and it may have been growing luxuriantly all around him, in the flora of temperate countries.

"Therefore I submit that Koch's premise in this matter does not sustain the conclusion, and that the whole question of the botanical position of the tubercle bacillus is an open one."—"The Prevention of Consumption," p. 10. Kegan Paul & Co.)

I will conclude with yet one more striking case, quoted also by Dr. Andrew, from Mr. Fleming,[71] which it seems to me impossible to explain without some such hypothesis:

"A large farmer at Leinheim (in Alsace) for five years in succession lost one cow from phthisis, and always in the same stall. A sixth animal, selected for its vigorous health, and the absence of any taint of phthisis in its pedigree, shared the same fate. Then all the wood-work of the stall was removed, the manger and rack thoroughly disinfected, and the spot left unoccupied for some time. It was then rebuilt and reoccupied by several animals in succession, but tuberculosis made no more victims among them or in any other part of the stable." As Dr. Andrew remarks: "In this case the disease must have been transmitted by some non-volatile substance in the stall itself; otherwise, and if the breath of the tainted animals had been infectious, it is difficult to believe that its neighbors on each side, for six years, could all have escaped unhurt. . . . It may have been an instance of local, not of personal, infection."

CHAPTER IV.

THE PREVENTION OF PHTHISIS.

We have now completed our survey of most of the conditions that are favorable or unfavorable to the development within the body of the bacillus of tubercle, and we have found that they may be briefly summed up under the following heads:

1. Congenital taint or inherited proclivity to the disease.

2. Tendency to the disease acquired by unhealthy modes of life, and especially by such as produce actual lesions of the parts into which the organism can make its way.

3. Sources of possible infection, or means of access through which it may gain an entrance into the system.

4. Conditions that foster and keep alive the organism in the immediate neighborhood of persons susceptible to the infection.

We are now in a position to consider what is possible to be done, and what should be attempted, to prevent the disease from attacking both human beings and animals associated in some relation or another with human beings.

1. With regard to inherited tuberculosis, or inherited vulnerability by the virus, if we were to accept Professor Baumgarten's theory of the chief mode of origin of the disease, namely, by spores, that like the pangenetic "gemmules" of Darwin, are implanted in us by our ancestors, and that may or may not remain latent all our lives, we should indeed despair of ever casting out this plague from our midst; for, even supposing that it was possible either to prevent all consumptives from marrying, or to keep their offspring under such conditions that the disease could not develop, it might still be transmitted through the second or third generation, and might break out at some subsequent period.

But it is quite otherwise with regard to inherited predisposition, if this consists, as we believe it does, mainly in a vul-

nerability only, and if, in nearly all cases, the actual germ of the disease comes from without the body. In this case it is quite possible to save even susceptible persons, by keeping them out of the way of infection, by clearing away the sources of the virus, or by doing away with the conditions under which it can exist, or by which it may be kept alive and ready to make its way into the system.

Doubtless, in view of the certain fact of inherited bodily qualities, and of the possible transmission of the disease congenitally, it is highly important to do what lies in our power to deter consumptive persons from marriage. But when we cast about for the means by which this may be accomplished, it soon becomes evident that they are very few and inadequate. It would of course be quite useless to attempt legislation, for restrictive laws on this subject could not be carried out in this country.

Certain writers have indeed laid down an elaborate series of prohibitory rules, forbidding marriages of consanguinity, and between the members of tuberculous families (Ancell, "Tuberculosis"); but even they acknowledge the impossibility of enforcing such rules. "Love laughs at locksmiths," and would certainly not submit to be bound by the chain of a prohibitory measure, even if one could be passed.

Still no one can doubt the importance of endeavoring to secure a healthy public opinion on the point, and fortunately most intelligent people are already, for the most part, on our side. Darwin's researches on the danger of breeding in and in, and on the advantages of cross-fertilization, together with the general experience of the breeders of stock, on the advantages of the selection of suitable and healthy strains, and the patent facts relating to family inheritance of phthisis—all these things have combined to make the heads of families cautious in sanctioning marriages with individuals suspected of having a tuberculous ancestry.

Medical men and ministers of religion may do a good deal to strengthen this feeling, and to discountenance marriages between relations, especially when the family has been tainted by tubercle; also, by pointing out the facts that have been ascertained as to hereditary tendency to disease, they may often succeed in preventing the marriage of tuberculous individuals.

But when, in spite of all such checks, these marriages have taken place, I believe—notwithstanding Professor Baumgarten's opinion—that much may be done to save the offspring from the disease.

A father or a mother whose partner has died of phthisis, and who has been left with children to bring up, may certainly hope to save them from the fatal inheritance, if due care is taken in their rearing and in their choice of occupation, and this is especially the case if the children have not been suckled by a consumptive mother. When this condition has been complied with, as it certainly should be in every case, the ordinary hygienic rules for infancy and childhood will, for the most part, suffice to keep the children in health; a well-drained, high, and airy site for the dwelling, entire cleanliness of house, clothing, and person, fresh air and light, abundance of good food, due exercise and rest, care during illness, and so on. I would, however, especially emphasize certain details of the hygienic code—thus, that milk and easily-digested fats should form an adequate part of the dietary, and that the milk, in every case where there is a tendency to tubercle, should be scrupulously boiled, and in some cases peptonized, or used as koumiss or junket.

Free ventilation is especially needed in apartments occupied by persons, whether children or adults, with a tendency to consumption.

Dr. MacCormac[72] gives a number of striking instances of the value of hyper-ventilation in warding off consumption. He also gives a graphic picture of his own practice in this respect. He says: "I would speak in especial of a chamber which I once entered, as I had often before entered it, early one winter morn. It was the sleeping-closet of my son. His low trestle-bed stood betwixt the severally widely-open window and door, while the keen but exquisitely fresh sweet atmosphere from wind-swept hills careered through the apartment ceaselessly. The hue of exuberant health mantled over the boy's every feature, while, bordering the margin of the coverlet, there extended a fringe of pure white snow, which the genius of the fragrant night had wafted in all harmlessly during the hours of my child's repose" (p. 7). Truly it needs an enthusiast to carry a principle so far as this, but I should be glad if something very little short of it were adopted in

every night nursery in the kingdom—if it could be said of all of them that

> Through the half-opened casements now there blew
> A sweet fresh air, that of flowers and sea
> Mingled together, smelt deliciously.[73]

Then, as to exercise, it should be such as to develop the chest as much as possible—not only by games, though this is the best method, but also by carefully graduated and adapted gymnastic exercises. It should also, as much as possible, be carried on in the open air, and with as little dust in the atmosphere as practicable.

Especial care must be taken during and after the illnesses to which childhood is liable. After measles and whooping-cough thorough examinations should be made to see that there is no lingering affection of the lungs, and that the chest is not left deformed in any way. The attendants should not rest satisfied with anything short of complete recovery, if this can by any means be attained, either by medicinal agents, or gymnastic exercise, or by change of climate; and equal care must be exercised after any of the exanthemata. Where enlarged lymphatic glands are left, they must be regarded as a possible source of danger, especially when they are the sequel to some external eruption or sore.

Where the parents are rich, care should be taken with regard to education—that it should not be over-pressed, and that it should be carried on in well-ventilated rooms, and if a boarding-school has to be selected, it should be one on a high and dry site, and not only the school-rooms but the dormitories should be inspected, to see that there is sufficient cubic space, and also that the warming and ventilation are properly carried out. Whenever possible, it would be well to choose a cubicle or bedroom where the window can be kept open at night, winter and summer.

Let both boys and girls have an abundance of open-air life, and play games such as cricket and tennis, that promote healthy exercise; let them be allowed to walk and run, or ride, as much as they can consistently with other duties. Let the boys hunt, shoot, or row; let them camp out, climb mountains, or spend their holidays in the country, or at the seaside, in healthy lodgings.

If it should be necessary to choose a business or profession, let it be one in which there will be but little office work and as much out-door employment as possible. In such cases as these the prospect of future gain must not be allowed to compete with the pursuit of health, and hence, one with less remuneration and future emolument must often be preferred. Let a boy choose to be a farmer, a breeder of cattle, at home or abroad in some suitable climate, or a land steward or agent, or a surveyor or civil engineer. In a lower grade, other occupations may have to be selected, such as that of an agricultural laborer with all its hardships, a sailor, or fisherman, a carter, butcher, cab-driver, railway guard, or even costermonger. I well remember one member of the latter craft who was in the third stage of phthisis, who had been attending the Addenbroke Dispensary for nine years, and whose disease certainly did not advance during the time that he was under my observation there—a period of three years—and such cases could be abundantly multiplied.

Something more needs to be done for the children of the poor by various public bodies, especially in the direction of securing better methods for the warming and efficient ventilation of schools.

Sir Henry Roscoe, in a recent paper, "On the Ventilation of Schools,"[74] deduces from the researches of Professors Carnelly and Haldane, the conclusion that "our primary schools are, as respects healthy atmospheres, in a deplorable condition," and he thinks that the secondary schools and private advertised schools are far worse than board schools. "We must not rest," he says, "until all our future elementary schools, to say nothing of the private schools, are ventilated by mechanical means, and the health of our children, physical and mental, is brought above the very low level at which it now stands."

2. Many of the remarks now made will apply, at any rate in principle, to the subjects of an acquired tendency to consumption. Those who have been sufferers from any weakening disorder, such as have been enumerated as a cause of this tendency, will have to be sedulously guarded against the entrance of the tubercular poison into their systems, and they must be rigorously debarred from all crowded assemblies.

With regard to affections of the lungs, however, I think we may use some discrimination in selecting cases that must be submitted to the restrictions it is needful to impose upon those most prone to phthisis.

Thus it is necessary that, during attacks of acute bronchitis, pleurisy, broncho-pneumonia, and other inflammatory complaints, care should be taken to secure the complete resolution of the disease; but when this has been attained, and the full elasticity of the lungs has returned, it has not been within my experience, that persons who have suffered from these complaints are more liable to consumption than other people, though of course subsequent attacks may at last leave the lungs more vulnerable by the disease.

After all these complaints, and especially after pleurisy, there is undoubtedly danger, so long as there remains any contraction of the chest, and want of full expansive power. It is well known how frequently phthisis follows pleurisy, and although this may in some cases be due to the fact that the pleurisy itself is of tubercular origin, in others the tubercular infection is grafted upon the injured organ at a period too remote from the original disease for it to have been its immediate precursor.

I have been in the habit of testing the movements of the chest with the stethometer in most forms of pleurisy, and in all cases where these movements are impaired by the attack I have formed an unfavorable prognosis, an opinion that has only too often been confirmed by the result, though in several cases the supervening phthisis has been some years before it has made its appearance.

There seems to be less reason to dread the occurrence of phthisis in chronic bronchitis, asthma, and emphysema, but I cannot altogether share the opinion of Rokitansky as to the immunity enjoyed by sufferers from the latter complaints, as I have several times seen their association with phthisis.

I should imagine also that in the partial emphysema that arises from atelectasis or impairment of certain portions only of the lung, a deposit of tubercle is but too likely to take place in the portions thus injured.

Still greater danger is also acknowledged to arise from accidental hemorrhage into the lung-tissue. Although hæmoptysis is frequently only a sign of incipient tubercular disease,

I am convinced that it is also sometimes simply its precursor, and the resulting phthisis has in my experience been more acute in its course. In this class of cases also the stethometer has been of no assistance in prognosis. I may remark here that, as an additional precaution against infection in this class of cases, and in all in whom there is a predisposition to phthisis, and when its subjects are obliged to attend crowded assemblies of any kind, I have been in the habit of recommending the temporary use of respirators charged with eucalyptol, so as to minimize the danger of inhaling tuberculous material.

I need not linger over the precautions that should be taken in the case of dusty work, especially such as involves the production of sharp, irritating particles; workingmen are now much more alive to the danger arising from it than they were formerly, when, as Dr. Hall, of Sheffield, tells us, the file-grinder looked upon early mortality from lung disease as inevitable, and rather welcomed it, as affording a chance of more speedy promotion.

It is probably still hopeless to expect that workpeople will use respirators to catch the dust on its way to the mouth, but fans are now almost universally employed to sweep it away from the worker.

It would, however, be a good thing if these people could be more frequently warned of the necessity of attending to the first beginnings of lung trouble, as we know that, in their first inception, many of these cases are not tuberculous.

In all cases of incipient chronic lung disease, wherever possible, an attempt should be made to obtain plenty of fresh air and sunshine, whether by change of climate or otherwise. I venture to put this matter in these terms because I believe that, in the treatment of such cases, wherever a dry, pure soil and germ-pure air exist, that is the best health-resort in which the largest amount of out-door occupation can be secured, together with the greatest amount of bodily comfort.

Hence it is that Davos Platz and San Moritz can vie with the Riviera and Algiers; Canada, with California and Mexico; the highlands of Africa, with the Canaries and Madeira.

3. With regard to the ingestion of tuberculous food, it is probable that too great laxity prevails in the inspection of

butchers' meat, and that its sale should be subject to more stringent regulations than it now is in our large towns. In France, by a decree passed in July, 1888, it is provided that "whenever the tubercular process affects the lining membrane of the chest or abdomen, the entire carcass shall be condemned," but in most other countries it is considered sufficient, when the disease is entirely local and not generalized, to cut out the diseased parts and suffer the meat to be sold, if otherwise sound and the beast well nourished. Professor Koch, himself, thinks there is no danger in this practice, and this opinion is shared by Cornil and Dujardin-Beaumetz in France, by Nosotti in Italy, and by Von Wesener in Germany.

But most of these opinions are based upon the idea that the meat in question should be well cooked, and it seems to me desirable that the Prussian practice should be followed, of plainly labelling meat that is regarded as in the least degree suspicious by the inspector, who should not suffer it to be sold without a caution to the buyer.

Still more decided precautions should be taken with regard to milk from tuberculous cows. Its power of conveying tubercle is fully proved, and its sale should be prohibited. In the mean time, also, as before said, the possibility of infection from this source should cause the heads of families either to make very sure as to the untainted source of the milk supplied to them, or should induce them to insist upon its being boiled before use.

In towns, it is impossible to trace the milk to its source, and the latter injunction becomes, therefore, more imperative. Probably, many more cases of infection from this source would occur in towns if it were not for the fact, pointed out by Bollinger, that the mixing of the milk of many cows diminishes, by dilution, the risk of conveying the disease.

The possibility of tubercle arising from this source, lays a heavy burden of responsibility upon those who have the care of the public health, and this burden, with regard to milk, has now been laid upon the Local Government Board and its subordinate local authorities.

By Section 9 of the Contagious Diseases (Animals) Act of 1886 (amending the act of 1878), the powers of the Privy Council respecting the inspection of cattle, and sanitary precautions relating to milk, are transferred to the Local Govern-

ment Board, and local authorities are empowered to make regulations respecting these points. Unfortunately, tuberculosis is not included in the definition of "disease" in the act, and the Departmental Committee on Pleuro-pneumonia and Tuberculosis report, in 1888, that "although in England and Ireland, under the provisions of the Nuisance Removal Act (as embodied in the Public Health Act, 1885), the medical officer of health, or inspector of nuisances, may seize tuberculous animals, yet such seizure is rarely performed."

The case with regard to milk is even more unsatisfactory. It is, doubtless, now the duty of rural sanitary authorities to supervise all dairies and cowsheds, and to prevent the export of possibly tainted milk; but, again, there is no direct provision against the supply of the milk of tuberculous cows; moreover, the local boards of places where milk is produced are not necessarily in union with the authorities of the places where it is consumed, and the members of the rural local boards are often unwilling to offend the farmers, and others by whom they are elected, and are not likely to take much care in the matter.

What is needed is greater solidarity among the various local authorities, so that the corporation of a town, for instance, might be in communication, through its health officers, with the inspectors in the rural districts from which the milk is supplied to the townspeople. They might thus ascertain directly the presence of disease, whether of man or beast, in the farms supplying the milk.

But even county councils cannot altogether perform the necessary duty of carrying out this organization, for the milk supply of a town may come from several different counties. I know, for instance, that Manchester is supplied not only from farms in Lancashire, but also from those in Cheshire, Derbyshire, Yorkshire, and even Staffordshire.

It is urgently necessary, therefore, that the laws relating to the sale of the flesh of tuberculous cattle, and the milk supplied from them, should be amended without delay, and also that some concerted action should be taken by health authorities with reference to the sale of milk in towns. (I am informed that several towns have obtained private acts, by which it is provided that their judicial officers of health may inspect any dairies, etc., beyond their boroughs from which

milk is supplied to them; and these provisions are included among the "model clauses" which may hereafter be the subject of general legislation. But it is not apparent from these clauses that any power is given to inspect the cows themselves, in order to judge whether they are tuberculous or not.)

4. The next, and I believe the most important, media for propagating consumption are the houses people dwell in, and the rooms in which they congregate together.

Architects and builders of all classes of dwellings have been in the past, and are still, largely responsible for a very large proportion of preventible mortality. It is only right that we should look to them in the future to rectify the mischievous modes of construction—both of mansions, and cottages, and public buildings of all kinds—that have proved such a fertile source of disease, and especially of consumption. It is incumbent upon them both to rectify existing buildings, and to erect new ones upon plans that are more in accordance with modern sanitary requirements. They must see to the exclusion of noxious ground-air from houses, to the prevention of the harborage of dust, to giving sufficiently copious streams of air without draughts, and to the extraction of foul air as soon as it is produced, and to the provision of abundance of light. They are not left without help in this regard. In Sir D. Dalton's excellent work on "Healthy Houses," there are ample and detailed instructions as to how these several objects may be accomplished.

Local authorities also cannot plead ignorance in excuse for neglect. The Model By-laws of the Local Government Board, if fully carried out, would to a great extent do away with the merely structural causes of phthisis. The whole of these by-laws are useful; but those relating to the width of streets (4–8), height of buildings (19), space around houses (53–55), concreting of cellars and foundations (9–10), damp-proof courses (17), quality of materials and fireplaces (11, 58), drainage (60), are of especial value in relation to our subject.

Much greater care should be exercised in respect to the warming and ventilation of public buildings. The openings for the latter purpose are for the most part quite inadequate, and the means of extracting foul air are often futile. It is a question also whether the methods used for introducing

warmed air do not generally devitalize it and make it unfit for healthy respiration.

The Model By-laws, moreover, only apply to new streets and buildings, and it is in the old parts of most large towns that the favorite breeding-places of phthisis are to be found. Recent reports by Dr. Russell in Glasgow, and by Dr. Thresh in Manchester, show how entirely unfit are many of these places for healthy habitation, and give evidence of the effects of overcrowding.

Dr. Thresh found, in Ancoats, that "the cubic space per head in the living-rooms and bedrooms in Ancoats is miserably inadequate for sustaining health;" in one case, a man and his wife, with five children, lived in one room—8 ft. 6 in. high, 10 ft. 6 in. long, and 9 ft. 3 in. wide—647 cubic feet in all; and he gives several similar cases in his Report to the Sanitary Association of Manchester.

These abominations in the shape of dwellings ought to be absolutely done away with—razed to the ground if they are incapable of alteration. Back-to-back houses should be converted into double houses with thorough ventilation. Closed streets, courts, and alleys should be opened up, and decent habitable houses built in their places. Breathing-spaces and playgrounds should be left in their midst.

Local authorities have ample powers now for dealing with all these matters.

Numerous acts of Parliament have been passed since the first Laboring Classes Lodging Houses Act of 1851, all of them having for their object the improvement of the dwellings of the working classes. There was one in 1866, and another in 1867, and in 1868 a very stringent measure was passed, commonly called Torrens's Act, but unfortunately it proved unworkable, owing to the absence of clauses giving sufficient compensation to owners of property.

Then, in 1875, came the most important effort in this direction, in Sir Richard Cross's Improvement Act, and it must be a source of no small satisfaction to the members of the Manchester college to know that this and other subsequent measures are mainly due to the representations made by them to the legislature as to the need for such improvement.

Thorough as this act was, however, it also was not found to work well in practice, and several large towns, notably

Edinburgh and Glasgow and Manchester, preferred to obtain private acts of their own, to using the rather cumbrous machinery provided for them in it. Accordingly amending acts were passed in 1879, remedying defects both in Torrens's and Sir R. Cross's acts, and in 1881 further efforts were made in this direction. Finally in 1885, after a royal commission had sat upon the subject and had reported that local authorities really now possessed ample powers—which for the most part they did not use—for improving cottage dwellings, a most important clause was introduced into the housing of the Working Classes Act of 1885, which made compulsory all that was only left permissive before in previous acts.

This clause runs as follows:

"Section 7. It shall be the duty of every local authority intrusted with the execution of laws relating to public health and local government, to put in force from time to time, as occasion may arise, the powers with which they are invested, so as to secure the proper sanitary condition of all premises within the area under the control of such authority."

If the local authority does not carry out this law, then any complainant may apply directly for a mandamus to compel them to do so, without the necessity of appealing first to the Local Government Board at Whitehall.

This is indeed an important clause, and if it is interpreted according to the rights of modern sanitary research, it ought to transform our large towns from their present condition of hotbeds of disease to a collection of smiling abodes of health.

In the matter of atmospheric impurities, cleanliness, light, and ventilation must be our chief resources.

The cleanly housewife's righteous horror of dust has a more scientific basis than she dreams of; as we have seen, it may be the vehicle of disease and death, and is something more than merely "matter in the wrong place." But with the exception of giving her this incentive to an incessant fight against it, I doubt whether we could teach her anything as to the best mode of dealing with it. I should be glad, however, to see all furniture and room-fittings so made as not to be the harborers of dust, with their edges bevelled off or rounded, and it would also be a good thing if the contents of the dust-pan were invariably burnt at once, instead of being stored up in a bin, or carried off to form a huge mound in some town's

yard, many of its lighter particles being carried away by the wind, to add to the other deadly ingredients of a polluted atmosphere.

It is interesting to note, as a result of Professor Carnelly's experiments,[75] that the influence of dirt as a fosterer of micro-organisms in the air has now been placed upon a scientific basis. His conclusions are shown in the following table:

TABLE VIII.—*Effect of Cleanliness.*

		Space per Person.	Carbonic Acid.	Organic Matter.	Micro-Organisms.
One-roomed houses,	Clean.....	295	7.99	2.34	18
	Dirty.....	200	9.87	3.23	41
	Dirtier	221	10.66	2.42	49
	Very dirty.	220	10.01	2.69	93
Two-roomed houses,	Very clean.	273	12.20	1.93	10
	Clean.....	264	9.34	1.37	22
	Dirty	233	9.40	2.03	69
Unventilated Board-schools,	Clean.....	167	19.68	3.25	91
	Average. ..	166	14.17	2.90	125
	Dirtier.....	191	22.47	2.73	198
Ventilated schools,	Very clean.	194	12.50	2.26	3
	Clean... ..	155	12.81	1.48	16
	Less clean..	152	10.78	1.75	30

It will be seen that cleanliness produced a difference of 18 to 93 in the one-roomed houses, 10 to 69 in two-roomed houses, 91 to 198 in unventilated, and 3 to 30 in ventilated schools.

And yet want of cleanliness is not solely responsible for the presence of organized germs.

Sir Henry Roscoe draws the following conclusions from Professor Carnelly's paper to the Royal Society:

(1) That "by mechanical ventilation, the micro-organisms (that is, the excess over and above those contained in the outside air) were nearly one-tenth, the organic matter one-seventh, and the carbonic acid nearly one-half, of what they were in the schools ventilated by ordinary methods, the average cubic spaces in the two schools being practically the same, or, if anything, slightly less in those ventilated mechanically. (2) Notwithstanding this very great improvement in the purity of the air, the temperature is even considerably higher than in the ordinarily ventilated schools; whereas, to produce such an improvement in purity by the ordinary method of opening

windows, etc., would have reduced the temperature to a very uncomfortable and dangerous degree. (3) This improvement is also obtained with little or no perceptible draught, and where a draught is perceptible, it is a warm and not a cold one, as is the case with ventilation by an open window. (4) Mechanical ventilation not only very considerably reduces the number of micro-organisms during the time that it is in action, but has also a marked effect after the ventilation has been stopped and replaced by natural ventilation, for the micro-organisms in the air do not rise to the level of the ordinarily ventilated schools for a considerable time."

It would be well if, in framing by-laws for all kinds of public buildings, and especially for schools, the suggestions made in Sir H. Roscoe's valuable paper could be followed.

Another table shows that the micro-organisms are derived from the rooms themselves.

TABLE IX.

Cubic Space per Person. Cubic Feet.	Naturally Ventilated. No. of Cases.	Carbonic Acid.	Organic Matter.	Total Micro-organisms.	Mechanically Ventilated. No. of Cases.	Carbonic Acid.	Organic Matter.	Total Micro-organisms.
50–100	6	21.5	16.2	119	—	—	—	—
100–150	14	15.5	19.6	128	7	14.0	7.8	23
150–200	5	18.9	12.3	150	8	11.4	9.6	14
200–250	9	21.1	16.8	188	5	11.8	12.3	10
250–300	4	17.1	9.5	187	—	—	—	—
300 and upward	4	15.1	11.8	12	6	13.0	3.7	2

In badly-ventilated schools, micro-organisms increase up to a certain point with increase of wall and door space, whereas, in mechanically-ventilated schools, where the air is quickly removed, the micro-organisms decrease with increase of cubic space.

Sir Henry Roscoe says: "We have already seen that cleanliness (see table, p. 267) exerts a most powerful influence on the number of micro-organisms. One would expect that the source of these organisms is the floor, especially the dirt lying about on it."

But that the loose dirt lying about on the surface of the floor is not of itself the chief source seems to follow from two facts. In the first place, one would expect that scrubbing the

floor would have a marked effect on the micro-organisms in the air. To test this, two similar schools were taken; one was scrubbed once a week for five weeks, and the other left unscrubbed. The bacteria were regularly determined in each, with the following result:

TABLE X.

	Scrubbed Room.	Unscrubbed Room.
Average of six days before scrubbing..	112	93
Average of 1st day after scrubbing....	31.5	70.5
" " 2d " " "	133	86
" " 3d " " "	147	112
" " 4th " " "	134	46
" " 5th " " "	108	99
General average after scrubbing.....	111	83

The total effect of scrubbing also was found to be *nil.* The scrubbing would remove the loose dirt, but not the dirt ingrained in the floor.

Another reason against the loose dirt being a main source of contamination is the fact that the infection of a school with micro-organisms takes place very gradually, new schools having much fewer than old ones; and similar results have been obtained by Miguel in new and old houses in Paris. Probably nothing short of total destruction would clear some of the older buildings from micro-organisms.

Even if we suppose that all the precautions so far mentioned could be strictly carried out, much still remains to be done before we can exorcise the demon of tuberculosis.

People must be educated to take advantage of the arrangements that we may hope will be made for their comfort and well-being. At present, many of the inhabitants of both town and country are quite capable of converting a palace into a pig-sty, and the best-laid plans for ventilation and cleanliness may not only "gang aft aglee," but may be deliberately frustrated by the ignorance, carelessness, or active prejudice of the people most concerned to carry them out.

These people will have to be taught the importance of the sanitary regulation of their households, and to this end they must know something of the laws of health, and they should

be assisted to make proper use of the various means that are placed at their disposal.

It would be a most beneficial thing if sanitary associations, or healthy homes societies, similar to those in Manchester, could be established in every town in the kingdom.

I have ventured to suggest to the Sanitary Institute the establishment of such societies, as part of its work in the towns where its congresses are held.

5. Hitherto we have been mainly occupied with the external precautions to be taken against absorbing the tubercular virus. We must turn now to those relating to the sufferer from consumption himself.

First, the treatment of the excretions from tubercular patients. Both the urine and fæces have been found to contain bacilli, and should therefore be disinfected, or otherwise safely disposed of; but we have seen that the most fertile source of infection in phthisis is probably the sputum of such patients expectorated on to the ground, on to floors, or into handkerchiefs, allowed to dry up, and, in the form of dust, permitted to lodge on the walls or in nooks and corners of dwellings, or to float about in all kinds of public assembly-rooms, whether for religious, political, or social meetings. Now we can say at once that this should never be permitted.

Englishmen are rather inclined to sneer at the abundant provision made on the Continent for the reception of expectorated matter, but it might be well for us if we were more cleanly in that respect in this country.

Undoubtedly, if the contents of these receptacles are simply consigned to dust-bins and left to gain virulence, as it is at least possible they may, by contact with organic filth, then the danger of infection from this material may be but little diminished; for when it dries up and portions of it are allowed to fly about in the atmosphere of the streets and lanes of a city, it may spread the disease, through the medium of the very air that we admit to our living-rooms in the laudable desire for ventilation.

But all such receptacles should be filled preferably with some liquid disinfectant, or with sawdust that has previously been charged with some efficient disinfectant, and their contents, like those of the dust-bins, should be scrupulously burnt,

either on kitchen fires, or in a furnace provided for the purpose by town authorities.

It would be well, also, if all phthisical patients would carry with them and use small portable spittoons, that could be carried in the pocket. They can be made for a few pence, and can be lined with paper charged with disinfecting substances, and their contents could readily be consigned to the fire at convenient intervals.

Disinfectants.—Numerous experiments have been made to determine the best means of disinfecting tuberculous material.

In Verneuil's "Études sur la Tuberculose," Dr. P. Villemin gives the results obtained with a prodigious number of different chemical substances. It would be useless to name the hundred-and-one of these bodies that have either given negative results, or that have only somewhat retarded the development of the bacillus. He found, however, that the following ingredients mixed with the cultivating medium completely sterilized it in the proportions which he employed—they are: hydrofluoric and silicic acids, fluosilicates of potassium, sodium, and iron, ammonia, naphthol (α and β), polysulphuret of potassium, tartar emetic, and sulphate of copper. (Among the class of substances that greatly retard the development of the bacillus, he places arsenious, boric, picric, pyrogallic, and sulphurous acids; benzin, chloroform, creosote, hyposulphite of soda, iodoform, menthol, phenate of soda, salol, and toluene. And he places in a third category those substances in which growth took place, but with some difficulty; among these we find acetone, aldehyde, biniodide of mercury, bromides of potassium, sodium, and ammonia; caffeine, camphor, chlorhydrate of ammonia, turpentine, eucalyptol, iodide of potassium, naphthalin, resorcin, sulphates of soda, magnesia, quinine, and zinc, thymol, and tungstate of soda.)

Dr. de Souza found that the following substances prevented all development: Mercuric ethyl, in the proportion of 1 in 35,000; benzoate of ethyl, 1 in 3,000; benzoate of methyl, 1 in 12,000; but menthol and iodoform had only a retarding influence.

Schill and Fischer ("Mitth. aus dem k. Gesundheitsamte") found corrosive sublimate most efficient; Sormani and Brugnatelli,[76] brom-ethyl, palladium and mercuric chlorides, carbolic

acid, creosote, naphthol, and saturated solutions of camphor in alcohol, lactic acid, and turpentine.

Unquestionably tuberculous material cannot be left to take care of itself. The various natural disinfecting agents, with perhaps the sole exception of fresh air and light, seem to be wholly inadequate to deal with it.

M. Galtier [77] has succeeded in inoculating tubercle with the juice of muscle, from tuberculous animals, after it has been raised, for twenty minutes, to a temperature of 60° C., and for ten minutes to a temperature of 71°, temperatures which, he says, are not exceeded in the centre of a large piece of meat cooked on the gridiron.

Desiccation, putrefaction (for ten to twenty days), freezing at temperatures from 3° to 8° below zero (C.), alternate freezing and thawing—none of these conditions destroy the infective power of tuberculous matter.

He found also that the urine of tuberculous animals was virulent, and he draws the conclusion that "it is indispensable to insist upon the disinfection of all objects soiled by tuberculous animals, of their excretions, of places they have occupied, of the dung-heaps, etc., in order to prevent the dissemination of the disease, and its transmission to man."

At the Manchester Hospital for Consumption we have been in the habit of using for the spit-cups a solution of mercuric chloride, 1 in 500, and I have also used "salufer," a fluosilicate, introduced by Mr. W. Thomson, of Manchester.

If the stools and urine of phthisical patients have to be disinfected, probably the best agents would be sulphate of copper, or sulphate of iron, or carbolic acid; but where water-closets are used, there is probably not much danger from this source.

It is recommended by Dr. Cornet and others that after the death of a phthisical patient, the rooms, and bedding, and clothes should be thoroughly disinfected, as after a death from a contagious disease, and a thorough cleansing of the whole premises.

There can be no doubt that this practice—at present, so far as I know, limited to Italy and Spain—ought to be universal.

If all the suggestions that have so far been made were to be carried into effect to any large extent, we might, I think,

fairly hope that in a few years there would be a considerable reduction of the phthisis death-rate; but, after all efforts in this direction have been made, there will probably still remain a large number of persons, actually suffering from the disease, who will escape from the net of precautions that we have endeavored to cast around them; and in their heedlessness and contempt of danger to themselves and others, they will continue to spread about the seeds of disease, and thus susceptible individuals will still continue to contract the complaint.

It becomes a serious question for the public and for the state, whether persons suffering from consumption, if they are "without proper lodging and accommodation" for preventing infection, should not be provided with asylums or hospital accommodation, until the disease is either cured or ends in death.

Enormous sums have been spent in the past, in the isolation of persons suffering from leprosy, a disease strictly analogous to phthisis, only still more chronic, and less easy to control by such a method. It would certainly be far easier to cleanse away and destroy phthisical sputum, than to prevent contamination from leprous sores.

If a poor country like Norway can provide asylums for a large proportion of its lepers, it is not too much to ask Great Britain to make the attempt to segregate those consumptives who are likely to be a source of danger to the community.

At the present time, the accommodation for cases of phthisis is very small. They are entirely shut out from most general hospitals, although they are admitted as out-patients to all dispensaries, and are thus free to scatter abroad the infective material in places where many persons peculiarly prone to the disease are sure to congregate.

The special hospitals for consumption are very few in number. They may almost be counted upon one's fingers: thus there are in the metropolis four such institutions, including the great Brompton Hospital, and together containing 615 beds.

At Bournemouth also there is the auxiliary sanatorium with 62 beds.

At Torquay (48), Ventnor (140), and St. Leonards (18), there are special hospitals, with an aggregate of 206 beds.

Possibly, also, at some of the numerous cottage-hospitals, cases may occasionally be taken in.

The only manufacturing towns in England to which such hospitals are attached are Liverpool, with 50 beds, Manchester with 37.

The workhouse hospitals are the chief refuges for destitute consumptives; but Dr. Bridges informs me that there are no data from which to ascertain how many of them are thus accommodated.

In any case there are certainly large numbers of persons suffering from active disease who are without proper means of treatment, and who are permitted to mix freely with the rest of the community.

I am well aware that, at the first blush, these proposals will be regarded by most people as stupendous, and perhaps as entirely impracticable; and if it was intended to provide for even a moiety of the consumptives of the country, they might rightly be so regarded. It would, in this case, mean an expenditure of several millions; and even if this amount were forthcoming, the social difficulties in the way would be still greater, for it would involve the separation of families, and, moreover, many consumptives are the sole bread-winners or guardians of families, and could not leave them.

But I do not seek for anything so gigantic as this would imply. I would simply ask that phthisis should be placed in the same list with other diseases requiring special measures to prevent its spread. Although, as before said, phthisis is not directly contagious, I venture to contend that there would be nothing unreasonable in thus classing the disease. Under the recently-passed Notification of Diseases Act, many local authorities have included enteric fever in their schedules—a disease strictly analogous, in that it is rarely, if ever, directly infectious, but which spreads mainly by means of excretions from the patients.

There would also be nothing strained in interpreting the words of the Public Health Act, 1875, in the clauses relating to infectious diseases, "without proper lodging and accommodation," so that they should mean that special measures must be put in force to prevent people from sowing broadcast the virulent particles coughed up from their diseased respiratory organs.

My proposition briefly would be this, that phthisis should be classed with other infective disorders; that every case, as

soon as it is discovered, should be notified to the medical officer of health. If necessary, it should be visited, to ascertain whether proper care is, or can be, taken to prevent injury to the public health. Where the case is that of a poor person, the local authority should see to the regular cleansing and whitewashing of the premises, and to the disposal of excretions, including especially the expectorated material. They should also inquire into, and rectify if necessary, the drainage and ventilation of the dweling; and after death, special measures should be taken for the cleansing and disinfection of house, bedding, and clothes.

After all this had been done for the safety of the non-phthisical portions of the family, there would next come the question of the propriety or possibility of removing the sick person to hospital. So long as he (or she) could work, and so long as he would consent to use the necessary means for destroying the infective material, it would be unnecessary to do more than I have already indicated; but when the patient becomes unable to follow his employment, and the family are obliged to seek for assistance from the parish, he has a claim to be received into the workhouse hospital, and such an asylum should be offered to him, and should be made as little humiliating and as free from ignominy as possible. When such a hospital is efficiently administered, as it should be, and often is now, when the nursing is performed in a kindly fashion, on Miss Nightingale's principles, and the patient is not left to the ministrations of any able-bodied pauper, as is sometimes the case; and when appropriate care is taken for the cleanly disposal of excreta of all kinds, then there could probably be no better fate in store for the poor invalid, and he might even soon be restored to his family, and be able to return to his work.

I would also put in a plea for those who are not reduced to pauperism, but who could be removed to hospital to receive appropriate treatment in its wards. Toward the close of their illness, persons who live in close, confined dwellings become a serious source of danger to the rest of the family, and as they are "without proper lodging and accommodation" for the safe treatment of such a disease, I would submit that it would be a legitimate expenditure on the part of local authorities, if they were to provide male and female wards for the recep-

tion of such cases, in connection with their hospitals for infectious diseases. Although consumption is not directly infectious, its products are undoubtedly infective under certain conditions such as have been mentioned, and local boards would be taking the right measures for preventing the spread of disease if they were to make such provision. There are probably few exanthematous diseases that could be so easily and effectively controlled.

But there would still remain a wide field open to private benevolence in the provision of sanatoriums or homes for these unfortunates.

I can conceive few objects better calculated to excite the compassion of all humane people than the condition of many of these poor sufferers, who are shut out from the benefits of general hospitals.

Most people have had an opportunity, some time in their lives, of watching the course of this insidious malady, and have witnessed the scenes of weakness and suffering that attend its later stages. And if it is painful to contemplate its ravages in those who are well-to-do, and surrounded by all the alleviations that can be brought to bear by medical science, how much more sad must it be in the homes of the poor, with scanty attendance, imperfect nursing, and with a lack of all kinds of comforts for the sick.

I can scarcely think that there would be much difficulty in raising the funds necessary for the care of such cases as are not yet reduced to pauperism, but who are really destitute of the appliances and comforts so necessary to a slowly-fading life.

The chief difficulty in the way would lie with two classes of objectors.

1. There are some practically-minded men who are not destitute of benevolent impulses, but who are wishful to see the useful application of the money they are willing to expend. They may have hesitated in the past, and may reasonably still hesitate, to give anything toward an object which they consider is tantamount to being merely an attempt to smooth the pillow of the dying. These men look upon hospitals for consumptives as asylums for the dying, and they would write over them Dante's inscription over the portal of hell, "Lasciate ogni speranza, voi ch' entrate."

We have already seen that this objection is based upon entirely erroneous information as to the curability of the disease, but it is not the less likely to have a certain amount of weight.

2. There are again others who believe that those who endeavor to preserve the lives of these poor wretches, are doing a positive injury to the future of the human race.

This view, again, is based upon erroneous views as to the nature of the hereditary transmission of tubercle. We have abundant reasons for believing that—by means of the destruction of the breeding-grounds of phthisis, and by improved hygienic measures, together with proper precautions against infection—the hereditary tendency to the disease would die out in a few generations, and that a healthy race would survive, free from tubercular taint, and endowed with the vivid intelligence and bright social attributes which are well known to be so common among those who now often succumb to the disease.

But to both these classes of objectors, as well as to others who have less excuse for parsimony in this regard, I would, in addition to meeting their arguments, adduce the powerful plea of self-interest.

Measures such as I have indicated would greatly diminish the danger of contracting the disease. Not only would some cases be entirely cured, but all of them would be restrained from spreading abroad the peculiar virus that might otherwise find a home in some susceptible system.

Moreover, such hospitals would be centres from which would spread enlightened opinions respecting the proper treatment of the complaint, and they would be the means of preventing its further extension.

I do not hesitate to say that, at present, the hospital accommodation for cases of phthisis is most inadequate, and that in place of the half-dozen of such institutions outside the metropolis, there ought to be hundreds of them scattered about the country, in suitable localities and attached to all the chief centres of the population.

The map of the distribution of leper-houses in England shows what large provision was made for leprosy at a time when the population was not much more than one-tenth of its present amount, and it is possible that advantage might be

taken of some of the funds left for that purpose, to apply them to the treatment of a strictly analogous and closely allied form of disease.

I am glad to be able to quote Dr. Coats, of Glasgow, who is a high authority on this subject, in favor of the scheme now put forth. In his "Lectures to Practitioners" (Longmans, Green & Co.), p. 211, he says.

"It may possibly in the future come to be a practical sanitary question whether consumptive patients should not, in some way, be isolated from the general community. There can be no doubt that their presence in the general community, by continually breeding and giving out large quantities of tubercular bacilli, supplies one of the necessary elements in the propagation of all tubercular disease; it may indeed be a question whether, in the interests of the patients themselves, as well as of the community at large, it will not be advisable to undertake their treatment in isolated special hospitals. If consumptives were treated in sanatoriums, placed in dry, airy situations, and with efficient ventilation indoors, as well as the opporunity of sufficient out-door exercise, then surely there would be a much larger proportion of cures than can be looked for under present circumstances." He also adduces the example of leprosy and its treatment by isolation, and its success, as a case in point.

In conclusion, perhaps I may be allowed to say a few words as to the principles that should guide us in endeavoring to check the disease at its outset.

This point is indeed strictly germane to our subject of the prevention of phthisis, for if we could succeed in arresting its progress in a certain number of cases, we should by so much diminish the chance of its spreading to others.

I. May I point out the unsatisfactory results that have arisen so far from the various researches that have been made for the purpose of killing the bacillus *in situ* of late years? The efforts of many physicians have been directed to this object, and the treatment, whether by inhalations, by sulphuretted hydrogen injections, or by germicide medicines, has had the one principle of endeavoring to destroy the bacillus after its entrance into the lungs. I was myself at one time beguiled into making attempts in this direction, but I have long been convinced of the extreme improbability of our

ever reaching the organisms in their hiding-places in the lung.

A very little study of the pathology of the disease will convince most men that when the organism is hedged round, as it usually is, with the products of inflammatory action, with exudation cells or fibroid material, and at a distance from vascular supply, it is almost hopeless to expect to reach it either through the air-passages or by the currents of the blood.

Let us have "war to the bacillus," by all means, but it must be war carried on outside the body and not within it. When once it is intrenched behind its barrier of exudative material, its individual existence, so far as we know, is safe against all our attacks.

II. What we have to do, after preventing reinforcements from being poured in from the outside, is to combat the irritation and inflammation caused by its presence by ordinary antiphlogistic measures, and then, by all the means in our power, so to strengthen the bodily forces as to enable them to deal with the invaders. If these receive no accession from without, and if they can be prevented from generating poisonous matter, more powerful for evil than themselves, they will generally succumb, either by starvation, or by being dried up, or got rid of by ordinary necrosis and suppuration.

To leave metaphor, I believe that our chief reliance must be placed upon means for reinvigorating the system—dietetic, hygienic, and medicinal.

III. At the same time, I would by no means discourage attempts to preserve adjacent structures and the rest of the body from attack. Certain of the inhalations most commonly used, such as carbolic acid, creosote, eucalyptus, oil of pine, menthol, iodine, etc., are probably of service in this direction, and some of them serve to control excessive secretion, and to render the mucous surfaces generally more healthy. It may be possible also that certain medicines, which have been proposed for this purpose, may prove, upon extended trial, to have the due preservative effect, and, hence, observations are needed upon the action of such drugs as tannin, creosote, iodoform, arsenic, salts of copper, etc., though I should myself give precedence to such as have been proved to increase the body-weight and to improve nutrition generally.

At the Manchester Hospital for Consumption a series of observations has been carried on for some years upon the action of different drugs, such as iodoform, the hypophosphites, guaiacol, creosote, tannin, and, latterly, upon the inhalation of pure ozonized oxygen; but it has been somewhat difficult to discriminate between the action of these substances and the general good influence of the hospital itself. Other workers in this field have also contributed evidence on this subject, but it is scarcely within the scope of this inquiry to attempt to sum up the results of these observations.

It may, however, be of some service if I remark again upon the inhalation of ozonized oxygen, which, so far as I know, as only been used as yet in the Manchester hospital, so far with encouraging results.

It was first tried in consequence of the well-known beneficial action of pure mountain and sea air, and it was thought possible that some of this benefit might be due to the ozone contained in such air. After ascertaining that pure oxygen when ozonized up to 9 or 11 per cent might be inhaled in considerable quantities without exciting inflammatory action, it was administered regularly to fifteen patients in all stages of the complaint, and the results were very marked in procuring improvement in general health—better appetite, sounder sleep, freedom from fever, and consequent gain in weight.[78]

And yet it certainly had no obvious germicidal action in many of the cases; though the amount of expectoration was diminished, there was but little difference to be noted in the number of bacilli on the microscopic slides.

IV. So far as I know, all the attempts that have been made, hitherto chiefly in France,[79] to discover an anti-bacillary vaccine, with which to render the tissues antagonistic to the bacillus, have signally failed; and although I would not object to further researches in this direction, it appears to be hardly likely that they will be successful against a complaint in which one attack confers no immunity against a second.

V. Hitherto the best results that have been obtained in the cure of consumption have been due to abundant supplies of fresh air and light and good food, with a large abundance of fat in an easily-assimilated condition, and to medicines that have assisted the general nutrition of the body.

VI. But if the question were to be addressed to medical

men by the Collective Investigation Committee, as to what simple measure has done most toward the cure of consumption, I believe the answer would be almost unanimous in favor of change of residence. In many instances, no doubt, the improvement would be ascribed to change of climate, and sometimes Egypt or Algiers, sometimes Davos, or Canada, or the Riviera, would receive the praise. Much good must undoubtedly arise from the favorable conditions to be found in these places, but I venture to ascribe a large proportion of the cures to the simple fact of removal from an infected area, to places where the air is free from active virus—and hence I am at one with those who believe that healthy homes for consumptives may be found in this country.

I have made these few remarks in the belief that my readers would prefer me to state plainly the convictions that have grown upon me in the course of a practice during which diseases of the lungs have long been especially the object of my study.

But all the conclusions now stated are obviously subject to revision in the light of evidence that may be forthcoming as the result of further research. (I would call attention to Dr. Vincent Harris's recent paper "On the Antiseptic Treatment of Phthisis" ("St. Barth.'s Hosp. Reports," XXV., 49); but I may observe that equally good results have been obtained in hospitals, apart from the use of antiseptic inhalations.)

The subject is still *sub judice*, but when the final judgment comes to be pronounced I only hope that there will remain sufficient ground for encouragement to persevere in the task of meeting and ultimately annihilating this terrible disease.

From a review of the course of this complaint in the past, and of its affinities with other preventible disorders—from our knowledge of its pathology, and of the influences most favorable to its spread—from our experience of its steady diminution within the last thirty years, and from the brief *résumé* of the measures that may be taken to arrest its course—from all these points we may surely learn to regard it as a preventible disease, and may look forward to its further diminution, if not to its ultimate extinction as a cause of death.

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DIFFERENTIATION

IN

RHEUMATIC DISEASES

(SO CALLED).

BY

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DIFFERENTIATION IN RHEUMATIC DISEASES (SO CALLED).

"*Non est vivere, sed valere, vita.*"

It may be regarded as a truism to say that as the empire of medical science gradually widens its bounds—some of its departments which have in the past attracted but too scant a measure of serious notice are only now beginning to receive the attention which is their due, and as in every department of human knowledge the synthetic method precedes the analytic, it is only when we pass from the stage of dealing in broad and general definitions, and arrive at that of differentiating and classifying that we can truly say that a subject of this kind has begun to be properly grasped; and in the case of chronic rheumatic diseases so called, the time is not so very far distant when the employment of the single term rheumatism was held sufficient, not only as a definition, but as an explanation of numerous other diseases, which it is now found cannot be either diagnosed or cured by the device of merely comprising them under one common term and treating them all alike.

It has, therefore, to be kept in view in approaching the special study of rheumatism, that before grappling with it in its numerous and distressing forms, these must be scientifically detailed and classified by the same methods by which all scientific knowledge is reached, viz., inductive reasoning based upon extensive and minute observations.

Time was, when to the old, the poor, and the overwrought —rheumatism seemed to be the natural and expected conclusion to a life of trouble, only capable of being mitigated by the warm clothing which charity might supply or proximity to a friendly fire-side. It was not provided for nor guarded against,

until its presence made itself felt, for it was looked upon as "Kismet," a thing that could not be avoided, and the idea of preventing its approach, of looking for constitutional symptoms, or, in fact, attempting anything beyond the mere alleviation of its pain—when once the victim was in its grip—was a thing unheard of. It did not then seem to be realized, that when a patient complained of pains, swollen joints, and other kindred deformities, that to say "this is rheumatism," and to prescribe some stereotyped treatment applicable to rheumatism so called, was not to exhaust the subject, nor even to lead the way to the ultimate hope of eradicating the source and origin of the evil. But now that we are beginning to understand the true nature, indications, and treatment of its various forms, and when the conviction is forced upon us that it is because of these that so many of the population around us are racked and torn with pains and deformed beyond the semblance of humanity, now we also begin to see the burden that lies upon us to relieve these victims, to make life more tolerable for them and better worth living, in fine to demonstrate to them that something is possible for them beyond mere physical existence, encumbered with pains and discomforts, and to teach them the truth and the meaning of that pregnant aphorism of antiquity—"non est vivere, sed valere, vita."

It will not, I trust, be looked upon as mere extravagance to say that by the increase of careful unremitting investigation into the various kinds of rheumatic diseases, especially with regard to their early and curable stages and the marks by which they may then be recognized, a better and higher result will inevitably be reached, viz., that in good time such symptoms and such effects will no longer be visible, and we shall no longer have among us the crippled frames of which I have spoken, and the lives of misery which are so often transmitted to an enfeebled posterity. This consummation so devoutly to be wished is, I fervently believe, no mere visionary's dream of the future, but is an actuality almost at hand. It is with such a result in view, and with the hope that our present proceedings may in some small degree contribute to it, that I am to address you on the subject of rheumatic diseases to-night.

The object is to endeavor to throw some further light upon

the doubts which exist as to what the differences are between the varieties of rheumatic disease so called. By these we mean the diseases to which the terms chronic rheumatism, rheumatoid arthritis, rheumatic arthritis, and what is more popularly known as rheumatic gout are applied.

A few months ago a work on this subject appeared by myself in conjunction with Mr. Charles T. Griffiths, in which were set forth opinions based upon our experiences and upon the careful analysis of upward of 3,000 cases, and which were almost purely clinical observations. We feel that it is eminently an important subject, in this country at least, that the persistency of investigation should be courted, for go to what part of the kingdom we will we find one or other of the abovementioned diseases to be in large proportion, as compared with almost any other in the whole practice of medicine. Although we cannot hope to better, to any considerable extent, those advanced in life who are suffering from a rheumatic affection, in spite of our utmost wishes and endeavors to do so, the subject which, we think, ought to hold a greater prominence than it does, is that of giving attention to the early interference in the same disease, or in one of them related to it, whether it be in a patient a little younger or much younger. For our experience has been that we have found that the tendency for the rheumatoidal element to develop in young persons is terribly on the increase.

Now, the result of our exertions has been to convince us of the following, that the difference between rheumatism and rheumatoid arthritis is of a greater and more extensive character than the text-books would have us believe, and so markedly have clinical facts impressed this truth upon us, that we gladly grasp any occasion or opportunity when we can explain the results of our research.

Fortunately for the success of our cause, our paths have led us into regions where rheumatism, rheumatoid arthritis, and rheumatic arthritis are grouped together for special treatment.

In the Royal Mineral Water Hospital at Bath can be seen any day these diseases in all their phases, and with all their distinguishing differences at any age and in every stage.

It must strike as being suggestive that we should have mentioned rheumatoid arthritis and rheumatic arthritis sepa-

rately; the reason for so doing will presently be made evident. But first of all let us look at rheumatism as compared with rheumatoid arthritis. This condition of chronic rheumatism is usually regarded as a most frequent one, but experience has shown that many of these cases of chronic rheumatism, so called, if inquired into more deeply, will prove to be one or other of the supposed allied diseases to be described later. When the sciatic nerve is attacked by rheumatism we call it sciatica, when the lumbar muscles—lumbago, when certain nerves we employ the term neuralgia, and yet all, in spite of their change of name, claim a share in their relation to chronic rheumatism. We do not mean to offer any obstacle to this arrangement; it is, in fact, by adopting this quasi-complication we carry simplification. But when the term chronic rheumatism is used it seems to us that it could not be utilized for better and clearer designation than in those cases—in which the joints are painful but not swollen, or in which there is a neuralgia, or even arthralgia associated with myalgia, or apart from it, or in which the various fasciæ are affected, or in which there is a general neuralgic condition supervening on an attack of acute rheumatism. This is what we prefer to call chronic rheumatism.

But in speaking of the symptoms of rheumatoid arthritis we will make reference to those symptoms which are sometimes put down as common to both.

Let us imagine two patients sitting side by side, one with chronic rheumatism and the other with rheumatoid arthritis. Now what do we see: in the rheumatoid arthritis case the first thing that strikes us is most probably the pallor of the patient, as compared with the chronic rheumatic. We look a little closer and the next thing we perceive will most probably be the joints. The patient with chronic rheumatism will present in this feature little or nothing; whereas, on the other hand, the rheumatoid arthritis patient will be more or less crippled. There will be distinct muscular atrophy in the rheumatoid arthritis case, and the complexion will present the pallor mentioned before, on closer inspection showing yellowish tinges on the face, neck, and perhaps elsewhere. Now, if we ask both patients if they ever have had rheumatic fever they both will probably say no. But further inquiry will elicit the probable fact that the family history of the patient with

rheumatism will be a good one, or perhaps at the most a rheumatic one, while the rheumatoid arthritis patient in most cases gives or shows a strumous taint. It is upon the basis of this strumous taint that we feel we must look for further assistance to guide us in the treatment of this terribly crippling malady. It is nearly always present more or less.

We are aware that this strumous history has not been particularly referred to in other descriptions of the disease; it being the almost invariable accompaniment has induced us to bring the matter forward, in fact to look upon struma and rheumatoid arthritis as a cause and effect—has seemed to us the one and plain characteristic in our investigations. Time does not allow of departing far afield for instances in support of the truth of this. The facts, as we have stated, have been so palpable and the distinctions at once so clear that perhaps it is wholly unnecessary. We would, however, make one exception and give one circumstance in support of the theory: take, for instance, the disease known as Charcot's disease. We see the condition which prevails in the joints, and on further inquiry we find a tabetic history. It is not for us to assert that the tabes and joint disease are cause and effect; although when we find a patient with a personal and family history of scrofula, struma, or tabes suffering from an affection of the joints, in which no pre-existing attack of rheumatism can be proved, are we very wrong in believing there is such a thing as cause and effect in the case we have before us?

Now, why have we mentioned rheumatoid arthritis and rheumatic arthritis as two distinct diseases? For the following reasons: Rheumatic arthritis is, we consider, an arthritis produced by rheumatism—be the attack acute or subacute. It may be asked now—Then what is chronic rheumatism of a joint when it supervenes on an acute attack? Is it rheumatic arthritis? In the strictest sense of the term it is. But what concerns us is not so much the difference between chronic rheumatism supervening on an acute attack with little joint affection, and chronic rheumatic arthritis supervening upon an acute attack of rheumatism with considerable joint implication, so much as the differences between chronic rheumatic arthritis and chronic rheumatoid arthritis.

We assert at once that the main difference is in the cause, and we shall also at once say that the main differences do not stop short at the cause.

In these rheumatic cases we shall find that the characters —that the physical characters—of the joints implicated present a very considerable difference. There is frequently a flexion and fixation in the phalangeal joints, accompanied by a swelling which ends abruptly above and below each joint, whether in those fixed or not, which is not observable in rheumatoid arthritis; for in rheumatoid arthritis the swellings have strong inclinations to be spindle-shaped—that is, graduating into the normal parts. It seems a singular fact that the proximal phalangeal joints of the second fingers are the favorite ones attacked in rheumatoid arthritis, and if a monarthritis still more so is it the case. In rheumatic arthritis we have found a monarthritis more the exception than the rule.

Again, in rheumatic arthritis, the swellings, although positive enough in themselves, can be characterized by many negative signs; for instance, there is not the thickening of the capsule to the same extent as in rheumatoid arthritis, and then there is no effusion: the swelling seems to be due to the intra-articular cartilages and capsules combined. When emaciation occurs, as it so frequently does in these cases, the condition of joint deformity is well seen. Taking, for example, the metacarpo-phalangeal articulations, which are so frequently affected, so much disorganization of joint structure takes place that distinct dislocation of the heads of the phalanges is noticed, causing the heads of the metacarpal bones to stand out, exposing about two-thirds of their articular surfaces: this seems to be the condition when disorganization of tissue has taken place; but when disease has occurred, and an attempt at organization has gone on, adhesions have formed and the joints are apparently anchylosed. In these cases the swellings are still less marked, it being quite common to observe no departure from the natural size, and yet perhaps the joints moulded together producing an actual condition of synostosis.

What diagnosis are we to put upon the results of acute rheumatism coming on in a patient already suffering from a previous arthritis, which has had its origin in a more or less obscure manner? That must depend on the ultimate clinical appearances prevailing. An important consideration here presents itself. Assuming that the patient in this recent at-

tack of acute rheumatism develops cardiac mischief, will not the effect on the progress of the resulting disease be regulated in proportion as the cardiac lesion is severe or mild? First of all, the action of a heart more or less rendered arhythmical by endocarditis, or myocarditis, upon a case of rheumatoid arthritis. The most important thing is perhaps the fact that tissues, especially muscular ones, already impoverished by the causes of rheumatoid arthritis, now lose another of their sources of nutrition by obstructed blood-supply—possibly there may be pulmonary congestion, or regurgitation with malaëration. That these complications in any way produce a separate and distinct pathological condition as a result of combined forces is not evident.

Among the leading characteristic constitutional symptoms of rheumatoid arthritis may be enumerated the following: General weakness, anæmia, emaciation, loss of appetite, arthralgia, lassitude, and the various typical neuroses, which we have minutely described elsewhere.

We do not deny that these distinctions are sometimes so ill-defined as to forbid us deciding upon an arbitrary classification—especially where we find a case of acute rheumatism occurring in a case of rheumatoid arthritis, or in which it has previously occurred. Here we often see the leading features of both rheumatic and rheumatoid arthritis displayed in the same individual, and yet, so satisfied are we with the proof, that in these cases we hold the patient may be suffering from both diseases distinctively; this we unhesitatingly call a "mixed case."

The conclusions that we think must be drawn from the clinical practice which has led to the publication of a book by ourselves ("The Rheumatic Diseases So-called," by Hugh Lane and Charles T. Griffiths. London: J. & A. Churchill), in which are set forth these differences in a much more exhaustive manner, as well as from this paper, must be stated at the outset to be that rheumatism and rheumatic arthritis are about as distinct from rheumatoid arthritis as they can possibly be. It may not be out of place to refer to the term rheumatic gout, which seems to be the favorite term in some of these conditions. Could any term be more misleading, when it is intended to convey the idea of a single affection? It at once suggests a combination of two separate diseases—rheumatism

on the one hand, gout on the other; and yet over and over again we find a patient afflicted at any period of life, in which there has been neither the slightest history of rheumatism nor the history of gout, but yet there is no hesitation shown in at once determining the case as one of rheumatic gout. It may be excusable for a patient, especially one having no connection with the profession, to use such a term, but for the reasons just stated, does it not seem to be an extravagant departure from the plain facts of medical nomenclature?

It has been our rule to speak of osteo-arthritis, not as a synonym for rheumatoid arthritis, but as an advanced condition of the latter, when bony implication has been distinct enough to merit the use of the Greek word osteo. By bony implication we mean eburnation, osteophytic outgrowths, enlargement, flattening, in short the later stages after the elastic swelling of the soft structures has manifested itself. (The pathology of these diseases was most carefully and skilfully investigated in an article in the Pathological Society's Transactions of 1886, by my brother, Mr. W. Arbuthnot Lane, M.S., F.R.C.S.) It may be satisfactory for us or any one to be able to grasp the precise condition, clinical or pathological, or both, of the cases which present the appearances we have described; but when it comes to be a question of treatment we must confess that the success has been proportionate to that which is obtained in the treatment of struma or phthisis, a fact which may go some way to further the theory advanced by us, of the association between these diseases and rheumatoid arthritis. In point of fact, the treatment which is adopted for the former we have found to be the most serviceable for the latter. Tonics, such as cod-liver oil, which, given in association with such medication as iron, arsenic, tincture of iodine, or the iodides of sodium, phosphate of lime, seem to have a totally different but increased beneficial action.

It must be confessed here that all the cases under treatment have been those which have been undergoing a course of the mineral waters of Bath, therefore due consideration must be given to this fact. So long as patients have not advanced to the condition of osteo-arthritis, the aforesaid treatment seems to be—in so far as medicines are concerned—the best at our disposal. It may be superfluous to add that proper clothing, for example, flannel or woollen clothing, and an equable temperature, etc., should not be forgotten.

As regards the local treatment, the occasional adoption of the frequent but gentle application of massage all tends to act by stimulating locally the circulation, and must benefit by improving the vitiated vitality of the joint structures.

When inflammatory adhesions have formed, the question of passive movement has, we have found, been better answered by somewhat more forcible means than have hitherto been laid down, viz., that of forcible flexion and extension; and where the adhesions have been so firm as to produce the condition known as fibrous anchylosis, we have found the same treatment equally satisfactory. Cases have passed through our hands which have presented themselves to us with knees flexed, bringing the legs nearly to right angles with the thighs, which under chloroform have been forcibly extended, treated in the orthodox way by ice-bag and splint for the course of a few days, which have put the patient into a position in which he or she has been able to exercise his or her locomotive powers, instead of passing day after day and week after week a miserable bedridden cripple.

We are quite aware there is nothing new in any of these modes of procedure, and yet at the same time the histories which patients have given of their states before coming under observation lead us to think that many of the methods enumerated have at least not been given a trial. Disappointments have been many it is true, and often have we found that what appeared to be of singular beneficial effect in one patient, in what appeared to be a parallel case if the same treatment has been pursued, no impression whatever has been made upon the progress of the case.

In treatment of hip affections in this disease, particular attention might be given to what we have found of marked benefit, and that is the treatment by counter-irritation. A blister applied behind the great trochanter has often produced marked benefit—so marked a benefit as to induce the patient to clamor for a repetition of the application.

The foregoing remarks apply essentially to the rheumatoid affections.

The treatment of rheumatic arthritis must be carried on in proportion as the amount of rheumatism is or has been present. Anti-rheumatic medication is too well known to justify our repetition of it here. The contractions which are more

frequent in rheumatic arthritis, and especially where the phalangeal joints are concerned, can be treated much upon the same lines by local interference, as they are in rheumatoid arthritis. If a mixed case a mixed treatment would be indicated; in short, that element which prevails must be combated by that particular style of treatment which we have shown to be the most beneficial.

How the mineral waters of Bath improve the tone of the patient hæmatinically, and how they neutralize any stored-up deleterious matter—how the tissues are washed thoroughly by an alkaline bath, how, by the internal use of Bath water the blood is washed and its alkalinity maintained, and how medicine (iodine, strychnine, especially arsenic in conjunction with these) and cod-liver oil, given with iron and iodides of sodium in gradually-increasing doses, are quite a sheet-anchor in rheumatoid and rheumatic emaciated patients, and which seem to exert almost specific influence in these diseases, are facts which are happily becoming well known.

But how the fact that patients do not repair to Bath in the early stages of the disease and how unfairly many of them, even when they do come, treat themselves, and the Bath waters too, by availing themselves of just sufficient baths to make them acquainted with the mode of bathing—are facts which are as regrettable as they are true; and especially when they draw the conclusion that they will derive just as much good by having their own warm baths at home, because they have not stayed long enough to see for themselves the good which would almost without fail show itself in appropriate cases: which can be summed up by saying that they should repair to Bath in the very early stages of the disease.

The after-results in all cases will be decided to no inconsiderable extent by the mode of life which the patient pursues; and, unfortunately, in so many of the cases from which we have derived so much valuable and interesting information, satisfactorily as they may have been turned out of hospital at one time—have appeared some months later suffering from an aggravation of the symptoms—often so clear as to show that only over-fatigue, and often that there has been a forced disregard, or a self-imposed disregard of rule—but at the same time it must be allowed them, a bounden obligation has obliged them to pursue avocations so unconducive to a more satisfactory end.

All will allow that this is not a fatal disease, and all must admit that the facilities for gaining information of pathological importance are difficult; but if clinical material is plentiful and if facilities for treatment are at hand, it must also be admitted that we have at least gained two-thirds of the battle.

Perhaps the greatest lesson to be learnt from these troublesome complaints—especially rheumatoid arthritis—is to be suspicious and take it in time, by adopting what we have elsewhere attempted to show is the most desired means—for early interference will often thwart its progress and its accompanying ravages.

In conclusion, gentlemen, let us sum up what we believe to be the result of the preceding observations.

We have to the best of our ability endeavored to show (1) What are the nature and characteristics of the diseases which we are combating and the marks by which they can be recognized; (2) the methods of treatment by which their ravages are to be met and relieved, or neutralized. We have not attempted to dogmatize upon the subject, we have merely set before you the fruits of laborious, and, we trust, we may venture to say to some extent original investigation. In this paper we have not sought to claim any merit for whatever we may have attempted to contribute to the fuller discussion of the subject, for we cannot forget that all contributions made toward medical science and every fresh ray of light cast upon it are, in the phrase of one of our greatest philosophers, but the picking up of pebbles by the shore of the ocean.

If we should succeed in warding off or postponing indefinitely the serious results which we all know too well, we should indeed have accomplished a humane feat; if we have not, we can take to ourselves the satisfaction, that we have done our best in trying.

RHEUMATOID ARTHRITIS.	RHEUMATIC ARTHRITIS.
1. Nervous disease due to debilitating causes.	1. Following rheumatism always.
2. Its last stage is osteo-arthritis.	2. Has no connection with osteo-arthritis.
3. Symptoms constitutional as well as local.	3. More confined to joints.

RHEUMATOID ARTHRITIS.	RHEUMATIC ARTHRITIS.
4. Joints most used are the first affected, smaller joints first, running centripetally. Temporo-maxillary joints often affected. Symmetry of joints affected more noticeable.	4. Large joints often first affected, running centrifugally, and chiefly joints affected that were attacked in previous acute rheumatism. Temporo-maxillary joints never affected. Not so often symmetrical.
5. Swelling typical, more or less fusiform, and with appearance of effusion.	5. Swelling as if solid enlargement of normal joint.
6. Deformity varying.	6. Greater tendency to fixation of joints in fixed position. Deformity in fingers is fixation in position of extreme flexion.
7. Anæmia early and constant symptom.	7. Anæmia, if present, a later symptom, and never so intense.
8. Many neurotic symptoms, especially early in the disease: sweating, headache, tingling, numbness, pigmentation of skin, etc.	8. Wanting; no headache, etc.
9. Very rarely have subacute attacks.	9. Greater tendency to subacute attacks.
10. Heart normal but rapid in action.	10. Heart often diseased.
11. Hard rapid pulse.	11. Pulse varies according to state of heart.
12. Reflexes normal or subnormal.	12. Reflexes increased, especially later in the disease.
13. Muscular atrophy concurrent with, and often previous to, joint affection, and small muscles chiefly.	13. Muscular atrophy subsequent to joints being affected; often large muscles first.
14. Any age.	14. Adults and mostly over middle age.

DESCRIPTION OF PLATES.

PLATE I.

Chronic Rheumatoid Arthritis.

Fig. 1.—Matilda H., aged twenty-four, admitted February 20th, 1889. First noticed pain and swelling in right wrist. No marked increase until October, 1888, then pains in finger-joints; then commenced swelling, as shown in Plate, in fifth metacarpo-phalangeal joint of left hand, the proximal phalangeal articulation of right hand, and swelling over carpus in same hand.

Chronic Rheumatic Arthritis.

Fig. 2.—The left hand of Rosa C., aged thirty-three, in which a good example of chronic rheumatic arthritis is shown by the well-defined swellings over the phalangeal articulations. Deformity and emaciation are also well marked.

This patient was quite well until she had acute rheumatism two and a half years ago. Since then the progress of the disease has been as shown.

A Mixed Case of Rheumatoid and Rheumatic Arthritis.

Fig. 3.—Left and right hands of Charlotte M., aged twenty-four. Twelve months before an attack of acute rheumatism noticed pains in joints, with progressive emaciation and sweating of the limbs. There was no swelling of the joints until after the acute attack, then the joints presented the appearance shown, viz., swelling less definable than in rheumatic arthritis in second and third proximal phalangeal joints of left hand, same joints in first and second of right hand and swelling over carpus in both hands.

Rheumatoid Arthritis showing Ulnar Tendency.

Fig. 4.—Right and left hands of Ann S., aged fifty-two. She first noticed pains in wrists when wringing clothes; has never had acute rheumatism. Well-marked rheumatoidal changes seen in metacarpo-phalangeal articulations (first and second) of right hand, and in ring finger proximal articulation in left hand.

PLATE II.

SHOWING TYPICAL CONTRACTIONS IN RHEUMATIC ARTHRITIS.

FIG. 5.—Right and left hands of Margaret M., aged thirty-seven; acute rheumatism twice. When seventeen years of age fingers at once assumed flexed and anchylosed condition, as depicted. This may be well regarded as an advanced condition of rheumatic arthritis, although the swelling and deformity appeared much about the same time.

THIS PLATE ILLUSTRATES THE DEFORMITIES OF A "MIXED CASE" OF RHEUMATOID AND RHEUMATIC ARTHRITIS.

FIGS. 6, 7, and 8.—The hands of Alfred P., 4, Allen's Ward. Twelve years previously patient developed rheumatoid arthritis in several joints in each hand. This went on without much change for two years, when he got an attack of acute rheumatism, after which the joints gradually assumed the appearance shown.

RHEUMATOID ARTHRITIS AND GOUTY DEPOSIT ON SAME HAND.

FIG. 9.—W. H., aged forty-five, carpenter. Father died of gout; mother, no rheumatism or gout. Two brothers; one suffers from rheumatoid arthritis. One sister; healthy. Twenty years ago got rheumatoid arthritis in left foot. Now parts affected as seen in Plate, in phalangeal joints of fingers. Right index finger, where alone the deposit of urate of soda was observed.

CHRONIC GOUT.

FIG. 10.—T. B., aged fifty-five, coachman. Father died of old age; mother also died of old age. No brothers or sisters affected with gout or rheumatism.

PLATE I.

FIG. 3.

FIG. 1.

FIG. 2.

FIG. 4.

PLATE II.

Fig. 5.

Fig. 9.

Fig 10.

Fig. 7.

Fig. 8.

Fig. 6.

MENTAL AFFECTIONS

OF

CHILDHOOD AND YOUTH,

AND OTHER PAPERS.

BY

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MENTAL AFFECTIONS OF CHILDHOOD AND YOUTH.

CHAPTER I.

WHEN you, sir, and your colleagues on the Council of the Medical Society of London, did me the honor to request me to deliver the Lettsomian Lectures on Medicine for this year, I bethought myself that mental deviations in childhood and youth had never been the subject of a disquisition from this chair, and that probably a period of nearly thirty years spent among children with various phases of mental affection might entitle me to bring before the members of this society material which, from the nature of the subject, can only be accumulated by a few.

There is not much to be found on this subject in the early records of medicine. Children who were afflicted by mental alienation or mental incapacity of any kind were placed in the category of idiots and regarded as beyond the pale of help. Formerly no attempt was made to ameliorate their condition, and a Spartan-like policy was rife, which troubled itself only with the survival of the fittest. It has been reserved for the medicine of modern times to occupy itself about the waifs of humanity who come under the category of the feeble in mind. The earliest attempts at the education of idiots took place in France some years since, but they were at first isolated efforts under the direction of M. Séguin at the Bicêtre. It was, however, in 1842 that attention was more particularly directed to the subject by the establishment of a school on the Abendberg, in Switzerland, which was opened by Dr. Guggenbühl, who entered on his work with true enthusiasm—an enthusiasm which one regrets was quenched by the flattery of English drawing-rooms. I shall never forget the feelings of disap-

pointment and chagrin when, on reaching the summit of the Abendberg, which I had mounted as a pilgrim to a shrine, I found the pupils in a state of physical and mental neglect while the patron saint was being enervated by the Capua-like influence of the West End of London. Fortunately for the pupils the Commune stepped in and closed what had become a parody on philanthropic effort.

About the same time M. Saegert, at Berlin, who had been engaged in the instruction of deaf-mutes, extended his efforts for the benefit of a class whose mutism was not the outcome of deafness. His school is still carried on with much skill in the neighborhood of Berlin, but with the immense disadvantage of being located in, and associated with, a large lunatic asylum. On a recent visit which I paid it I found excellent work was being done there although handicapped by the association to which I have referred. It was in the year 1846 that a general movement took place in efforts for ameliorating this afflicted class. Germany took the lead by the establishment of a school at Leipzig. Discussions in the periodical press were initiated by Mrs. Plumbe, of London, whose personal interest in the matter forced the subject on the attention of such philanthropists as Dr. Conolly and Dr. Andrew Reed. Synchronously, public attention was being given to the subject in the United States of America, where, while politicians were delaying action in the matter, the private enterprise of the late Dr. Wilbur brought it to a practical issue. England meanwhile commenced the work by the establishment of a small school at Bath. It was not, however, till 1847 that the great effort was made which resulted in starting a small institution at Highgate in 1848 and subsequently another at Colchester. These grew into the large institution at Earlswood, of which in 1858, at the mingling of the inmates from these homes at Highgate and Colchester, I undertook the superintendence. In recent years other institutions have been created both in England, Ireland, Scotland, the United States, and on the Continent of Europe. Schools have been established at Darenth for the feeble-minded paupers of London. One hopes that the time may not be far distant when suitable provision may lie within the reach of the afflicted poor who live beyond the metropolitan area.

It is not uncommon to class all cases of mental lesion oc-

curring in the young under the category of idiocy, or to speak of those afflicted with the graver forms of the malady as idiots, while the subjects of the milder or less grave manifestations are called imbeciles. This nomenclature is open to grave objection. The term imbecile is very often applied to that class of mental infirmity which is the outcome of deteriorating organic causes, often senile. Men or women who may have been in their time capable citizens become the subjects of senile changes of nutrition and lapse into a condition of childishness. It is people of this class who are rightly termed imbeciles, and to whom in my opinion the designation should be thoroughly restricted. I know of no defining limitation between so-called idiocy and so-called imbecility. The gradations of mental incapacity are as numerous and delicate as are those of mental capacity among those who are doing the world's work. The division, therefore, into imbeciles and idiots is thoroughly wrong and misleading. I have no great liking for the term idiot. It is so frequently a name of reproach. Moreover, in most cases it does not fairly represent the conditions which exist. The word idiot means "solitary," and the typical idiot knows nothing, sees nothing, does nothing, and this typical idiot is scarcely ever met with except in anencephalous monsters. This objection to the term idiot is not a mere sentimental one on my part. No one likes the name, and no mother will admit that her child deserves the title. The constant introduction of a case from medical men is, "I send you a little child for your opinion, but it is not an idiot;" or the mother brings her child to one, saying, "I have come to consult you about my boy, but he is not an idiot." This is the regular formula. A great impediment is thereby introduced to the early appreciation of the lesion and to its early treatment. The term idiot might be advantageously replaced by that of feeble-minded, idiocy being in fact mental feebleness depending on malnutrition or disease of the nervous centres taking place anterior to birth or during the developmental years of childhood and youth. Idiocy is therefore readily differentiated from other forms of mental alienation. The term imbecile should be applied to the cases of dementia which crowd our lunatic asylums and who are in an entirely different category from the feeble-minded; they are gradually deteriorating in physical, mental, and moral condition; they are in

the position of spendthrifts who have dissipated their fortune, while idiots for the most part have never entered on a fortune to dissipate.

Some years since I was struck by the remarkable resemblance of feeble-minded children to the various ethnic types of the human family, and showed, in a paper which I contributed to the "London Hospital Reports" in 1866, in how many instances one could refer them to one or other of the ethnological families. I have had under my care typical examples of the negroid family, with characteristic malar bones, the prominent eyes, the puffy lips and retreating chin. They have had the woolly hair, although not black, nor has the skin acquired pigmentary deposit. They have been examples of white negroes, but of European descent. Several, again, have arranged themselves around the Malay variety, with soft, black, curly hair, prominent upper jaws and capacious mouths, types of the South Sea Islands. I have also met with a few instances of the North American Indian type, with shortened forehead, prominent cheeks, deep-set eyes, and slightly apish nose. A considerable number range themselves under the Mongolian type. More than ten per cent of congenital, feeble-minded children are typical Mongols. They present characteristics so marked that when the members of this type are placed in proximity it is difficult to believe that they are not brothers and sisters. In fact their resemblance is infinitely greater to one another than to the members of their own families. They rarely have black hair, as in the real Mongol, but it is of a brownish color, straight and sparse. The face is flat and broad and destitute of prominence. The cheeks are roundish and widened laterally. The eyes are obliquely placed and the internal canthi more than normally separated. The palpebral fissure is very narrow, the forehead is wrinkled transversely from the constant use of the occipito-frontalis muscle in opening the eyes. The lips are large and thick, with transverse fissures. The tongue is long and thick and very rugous. The nose is small. The skin has a tawny color, and is deficient in elasticity, giving on the hands the appearance of being larger than is necessary. The ethnic classification of idiocy which I indicated is of extreme interest philosophically as well as of value practically. Philosophically because it throws light on a question which very much agitated public opinion about the

time of the American Civil War. The work of Nott and Gliddon labored to prove that the various ethnic families were distinct species, and a strong argument was based on this to justify a certain domestic institution. If, however, it can be shown that from some deteriorating influence the children of Caucasian parents can be removed into another ethnic type, it is a strong corroborative argument that the difference is a variable and not a specific one. The classification is also a practical one. We are able to say, with the greatest possible certainty, that the members of these ethnic types date the origin of their mental feebleness to congenital causes.

It is often of great importance to determine the question as to whether the affliction has had an accidental beginning. The medical attendant may be charged with malpraxis. The nurse may be suspected of having allowed the infant to fall or of having drugged it with opiates. The being able to refer the child to an ethnic type other than Caucasian settles beyond question that the cause of the malady, whatever it may be, was antecedent to birth. Again and again has this process of reasoning come to my assistance in determining questions of the gravest possible import, and enabled me to assure anxious friends that innocent people have been unjustly blamed. Not only so, by a recognition of type we are able to determine the physical as well as mental and moral characteristics of the child in a way which astonishes the mother, who finds one is able to anticipate all she has to relate. This is especially the case with the Mongolian type, the numerous instances of which coming under one's notice enables one to become familiar with its leading characteristics. These children have always great power of imitation and become extremely good mimics. Several patients who have been under my care have been wont to convert their pillow-slips into surplices and to imitate, in tone and gesture, the clergyman or chaplain they have recently heard. Their power of imitation is moreover not limited to things clerical. I have known a ventriloquist to be convulsed with laughter between the first and second parts of his entertainment on seeing a Mongolian patient mount the platform, and hearing him grotesquely imitate the performance with which the audience had been entertained. They have a strong sense of the ridiculous; this is indicated by their humorous remarks and the laughter with which they

hail accidental falls, even of those to whom they are most attached. Another feature is their great obstinacy—they can only be guided by consummate tact. No amount of coercion will induce them to do that which they have made up their minds not to do. Sometimes they initiate a struggle for mastery, and the day previous will determine what they will or will not do on the next day. Often they will talk to themselves, and they may be heard rehearsing the disputes which they think will be the feature of the following day. They in fact, go through a play in which the patient, doctor, governess, and nurses are the *dramatis personæ*—a play in which the patient is represented as defying and contravening the wishes of those in authority. Whether it be the question of going to church, to school, or for a walk, discretion will often be the better part of valor, by not giving orders which will run counter to the intended disobedience, and thus maintaining the appearance of authority while being virtually beaten. They are always amiable both to their companions and to animals. They are not passionate nor strongly affectionate. They are usually able to be taught to speak; the speech, however, is somewhat thick and indistinct, and destitute of musical cadence. The co-ordinating faculty is abnormal, but may be greatly improved by training. The circulation is usually feeble, and whatever advance is made intellectually in the summer some amount of retrogression may be expected in the winter. They undergo, in fact, a species of hibernation; not only are they prone to chilblains and frost-bite, they are but little tolerant of excessive heat, and proximity to a fire which to many would be only agreeable would, to patients of this class, be attended by serious blistering of the legs, even when protected by stockings or other articles of clothing. The resemblance to one another is so great in members of this family, both in their physical, moral, and intellectual natures, that the probability was forced on one that there was some unity of cause for their malady. Further investigation pointed out that phthisis was very frequently met with in the history of their progenitors. It is noticeable also that these children have not a long career, very few reaching adult life, being prone to succumb to serious illness or to become phthisical like their ancestors. Their crania have a marked similarity, they are all brachycephalic, and the posterior part is ill-developed.

Latterly I have been accustomed to adopt a classification based on the etiology of the cases. This is valuable from its practical bearing, and because it brings into prominence a class which was formerly not considered, or at all events had not the attention given to it which it merited.

It was very early presented to my notice that a large number of feeble-minded children were capable of being referred to one or other of two great groups—the one where there was a complete history of the congenital origin of the malady, with the physical proofs, which I shall presently refer to, and the other where it was no less clear that the asseverations of the mother that her child was born with ordinary intelligence was quite correct, but that some accident or some extension of disease equivalent to an accident had wrought on the cerebral centres disastrous changes, interfering with intellectual manifestations. Parents always prefer to refer the case to a post-uterine or non-congenital origin, partly because they think it frees them from the suspicion of hereditary influence, and partly from a notion that the child is more likely to be restored to its pristine state. We have these two well-defined classes: (1) The congenital, and (2) the accidental. On investigating, however, a large number of cases I became familiar with many instances which it was impossible to include in either of these categories. There was no history of accident nor of any illness akin to accident; the examination, however thorough, revealed nothing which would warrant the opinion that the origin was accidental. There was, moreover, in these cases, no reason to regard them as congenital. On the contrary, all the historical evidence, as well as all the physical evidence, positively refuted any such idea.

Under what head, therefore, were they to be placed? I found that the history was somewhat of the following. Their early months of babyhood were perfectly uneventful; there had been nothing to cause the slightest anxiety; intelligence had dawned in the accustomed way, when, first dentition proceeding, a change had come over the aspect of the child. Its look had lost its wonted brightness; it took less notice of those around it; many of its movements became rhythmical and automatic, and with or without convulsions there was a cessation of the increasing intelligence which had marked its early

career; anxiety was felt on account of the deferred speech, still more from the lessened responsiveness to all the endearments of its friends. In others the crisis at first dentition is not so marked. Speech may be a little deferred, but it comes, and with it more mental power; at second dentition, however, they are prone to crises in which the intelligence becomes altered, they have night terrors, and not infrequently loss of speech. I have had many examples of children who had spoken well and with understanding, but who lost speech at the period of second dentition, and had also a suspension of mental growth.

I have now under my observation a boy who, except that he was a little backward in speaking, not talking till he was two years of age, attracted no particular attention during the first six years of his life. During the period of second dentition, without any fit or convulsion, he suddenly lost speech. He heard everything that was said, but never replied to a question. He would caress and coax, but never asked for what he wanted. It was not a case of aphonia; he appeared to have no power to convert ideas into words. He would cry peevishly if there was something he wanted that he could not have. This condition of things continued for eighteen months, when, suspecting masturbation, he was circumcised by Mr. Heath. Gradually, after two years' absence, speech returned. He had to be taught anew, first the names of objects, and then to build up sentences until, at the end of six months, my notebook says, "Speaks several sentences voluntarily." However, he afterward always spoke of himself in the third person. He is now passing through the evolutionary period of puberty without any recurrence of the loss of speech faculty, but he has never regained active mental power. There is reason to regard it as a case of developmental feeble-mindedness resulting from illness of his mother at the seventh month of pregnancy.

I have had under my care two brothers who had spoken with discrimination and understood well two languages, but who both lost speech at the period of second dentition. As the elder one approached that period, gradually, without any paroxysmal event, he lost speech, and when the younger one arrived at the same age, gradually, but entirely, did he lose speech also. It may be, however, that the periods of first and

Second dentition are passed harmlessly and the breakdown is reserved for the time of puberty. Many at this time become suspicious and reserved, some become hyperconscientious, are always practising a process of introspection, are disturbed in their mind lest they should not have rightly stated any circumstance, or, if they have correctly stated it, whether they have put the facts in such a way as to have produced the right impression; many become epileptic, with rapid declension of intellectual power. These cases have usually characteristic crania; they are dolichocephalic and are prow-shaped anteriorly—the line corresponding to the medio-frontal suture being a prominent ridge. There is reason to believe that in these cases there has been an arrest of the synostosis of the medio-frontal suture which should have taken place during intra-uterine life, so that the lateral pressure on the separated frontal bones determines, when the deferred ossification takes place, a prominence where there should have been a plane or slightly concave surface between the frontal eminences. In the great bulk of these cases well-marked evidence can be obtained of some disturbing cause toward the later months of pregnancy, which has led to this condition; and although the deferred synostosis and its consequent deformity is of no consequence, it is reasonable to believe that the same cause which arrested the bony union has also arrested the development of the cerebral centres and rendered them more unstable. Certain it is that children with such a conformation are almost sure to break down at one or other of the developmental epochs. Their nervous system would appear to be equal to the requirements of growth but not of development. They form a class of cases which I have suggested should be called the "Developmental," as contradistinguished from the "Congenital" on the one hand, and the "Accidental" on the other. They are a very important class, because, forewarned, catastrophes may be avoided. They are the cases which break down by over-excitement in babyhood and by "over-pressure" in schools at second dentition and puberty. So frequent is the association of this condition of the cranium with neuroses that I have been accustomed for many years to point this out to my students at the London Hospital, and to show them that the prow-shaped skull is an outward and visible sign of an unstable nervous system, not of itself a cause, but indicat-

ing, like the seaweeds on the seashore, how far the tide has come. The members of this class do not give evidence of mental defect before their breakdown; they furnish, however, a number of those who become petulant, wayward vagrants from the elementary school, runaways from the public school, sometimes interesting and with flashes of precocious genius, they become the subjects of headache under continuous intellectual strain, a headache which, if not regarded, leads on infallibly to disastrous neuroses or developmental idiocy.

A large number of boys and girls come under my notice who are not feeble-minded, who have in a high degree the prow-shaped forehead, and who have their nervous system in such an unstable equilibrium that the least intellectual pressure at developmental epochs is attended by disastrous results. They are brought to me on account of severe frontal headache, or of wayward petulance, or incapacity for sustained mental exertion. I cannot better illustrate the kind of case which so frequently comes under my observation, and the serious character of which it is of the first importance early and clearly to recognize, than by quoting from the letter of the mother of one such patient. She says, "I have a boy eight and a half years old who is continually suffering with headache from temple to temple, and over the front half of head. He is a child of fine physique, capable, practical, clever, so far as the head permits of lessons, which means but a short amount and often missed altogether, for the same reason—"headache"—apparently the picture of health, high spirits, active, bright, yet done up with so little. The child is not a rickety creature —more is the puzzle. We shall bring him to see you on Tuesday next, and I think it better to give you all particulars before our visit that you may form an opinion on the whole. In the spring after a certain pressure of the usual morning work, he would turn gray, gasp for air, and, with windows all open, say he was choked. These attacks were frequent, and the sensations in the throat seemed to frighten him greatly. Lately I have heard less of this; now it seems 'head' affecting him 'all over' as he expresses it.

"Since then he has grown tall and much stronger, crickets fairly well, can handle any tool 'properly,' has good sense, good memory, a bad or rather tempestuous temper, quickly over, strong will, and ought to be a boy well to the front; but,

alas for such hopes, there is ever a something cropping up which knocks it all over. Then fatigue, long journeys, lessons, and all is depression and pain, and a heavy dulness of power (never of intellect) which is heart-grieving to me. Writing tires him, yet he works his Latin sentences with ease aloud, only two a day. Two hours' work has become half an hour, sometimes lately five minutes. He remains still over-full of life and go, at times, with no real strength, irritable, open, upright, self-willed, loving, very true, still all wrong, and why?"

When the boy presented himself to me he displayed a typical neurotic forehead, and there was a very complete history of severe emotional disturbance on the part of the mother between the sixth and seventh month of pregnancy. I counselled complete abstention from intellectual work during the remaining period of second dentition. It was very clear to my mind that any continued pressure would lead, through convulsions, to developmental idiocy.

Dr. West has pointed out how stammering never occurs among young children, and says, "I never knew a child stammer before the commencement of the second dentition." My own experience would lead me to confirm the observations of that distinguished physician, and I would further say that I have never met with a case of stammering at that period which did not bear evidence of its being a developmental neurosis, and that its origin could be traced back to a period anterior to birth, to an arrest of development which begat a proclivity to nervous breakdown. In these cases the approach of puberty is a period of grave anxiety. It is at that time that masturbation is so liable to lead to disastrous results, and that epilepsy is so prone to occur. The nervous system may have been stable through the developmental periods of first and second dentition and yet break down at the evolution of puberty, and there is much sagacity in Dr. West's observation: "It is usually with the evolution of the sexual system that hysteria shows itself, and with the pressure of life's cares that the mind is thrown off its balance, and then it is with regard to both that the ancestral taint first displays itself; so too, is it, I believe, to a great degree with the hereditary tendency to epilepsy." It is, I would venture to say, the influence of the neurotic mother on the embryo during the later months

of development that begets the proclivity which is here referred to.

I have alluded already to a group which I have ventured to describe as "accidental." I wish thereby to refer to a class of cases which differ from the "developmental" in the date of the origin of their calamity. They are children who are born, or ready to be born, with all the potentiality of intelligence, but whose brain becomes damaged by traumatic lesions, by meningitis, or by inflammatory disease. There is this one character running through the class—a character on which I wish to lay as great stress as I have on the prow-shaped cranium of the developmental class, viz., the absence of any of the physical aspects of feeble-mindedness. They are bright in their expression, often active in their movements, agile to a degree, docile in their temperament, fearless as to danger, persevering in mischief, petulant to have their own way. Their language is one of gesture only; living in a world of their own they are regardless of the ordinary circumstances around them, and yield only to the counter-fascination of music.

These are the cases in which mothers entertain the strongest hope, and in which the doctor indorses the hope with confidence based on the pretty waywardness of the child. I cannot conceive too strongly grave caution in the prognosis which should be given in such cases; they are the most disappointing which we are called upon to treat. A period of nearly thirty years has enabled me to study not only the present but the future of such children, to make a forecast, based on experience as to results, and to correct the notions of sanguine hopefulness. So interesting are they in appearance that it is difficult to realize that they will not be perfectly responsive to training, and that speech will not be speedily gained. I know nothing more painful than the long motherly expectancy of years, how, month after month, the hopes are kept at high tension waiting for the prattle which never comes. How the self-contained and self-absorbed little one cares not to be entertained other than in his own dreamland, and by automatic movements of his fingers or rhythmical movements of his body. I cannot recommend too strongly that caution should be used in giving a hopeful prognosis concerning children of this class. They have well-formed heads, finely-textured skins, well-chiselled mouths, sparkling eyes, features when in repose

leading one to augur only brightness and intelligence. Surely, it may be thought, the mind is ready to be developed from such a casket, and time only is required to insure the thorough realization of all one's wishes. Opinions based on such a theory will prove utterly fallacious. In these cases there is no outward sign of mental vacuity, for there has been nothing during the period of intra-uterine life to arrest the evolutionary stages, and stamp its impress on the bodily or facial formation. The cause of the mental deficiency has been something occurring during post-uterine life—some catastrophe not inherent in the child, no hereditary taint to mar the beauty of his visage or the grace of his cranial contour; yet there is something more potent for evil than in the case of many a malformed face and many a distorted skull. He runs to you when called, but makes no response in words. He returns your kiss by a bite, and runs away with agile steps, rolling his head with a horizontal swaying motion, or with fingers in ears or at eyeballs producing distorted sounds or double vision, and as he goes, rushing to knock down objects in order to produce an unharmonious noise. They are cases with a vast amount of surplus nervous energy, and although much may be done by training to divert the energy into better channels, the improvement will be smaller than what may be obtained from apparently less promising children, because, as I have elsewhere said, there is more improvement to be obtained from an ill-developed than from a damaged brain.

The late Professor Griesinger, with whom I have frequently had opportunities of discussing this and kindred subjects, describes two varieties of idiots—the apathetic and the excited. The apathetic class he describes as awkward, clumsy, and disproportioned, with repulsive old-looking features. From their torpor and impassiveness they seem to be in a dreamy state. Their expression is either brooding and melancholy, or vacuous and indifferent. The excited or agitated class he describes as just as stupid as the other, but quick in movement and irritable, passing rapidly from one impression to another, and quite incapable of fixing anything on their minds. I have no doubt Griesinger had in view, in describing the latter class, some of the accidental cases whose manifestations I have been discussing. There is no attempt, however, in this classification to refer them to their cause, nor can I admit that the division is true to nature or practically useful.

Having thus discussed two of the great classes, the accidental and the developmental, there remains for me to describe the characteristics of the remaining one, viz., the congenital. This contains by far the largest number of subjects, and presents characters which are of great value in determining the origin and future of its members. They are less interesting in appearance but more amenable to training, other things being equal, than either of the other two classes, and especially than the members of the accidental class. The origin of their malady dates from earlier in intra-uterine life than does that of the members of the developmental class, and in many cases the proclivity resides in the germ-cell or sperm-cell, as the result of gradual degeneration. That being so, it is not surprising that members of this class should bear in their bodily formation marks of physical change. They for the most part have a tendency to fall under one or other of the ethnic groups which I referred to in the early part of this lecture. Some years since I gave great attention to this subject, and prepared much material for a paper on the physical aspects of idiocy. A great many descriptions had been written, by no means precise, on the intellectual condition of idiots, but none, so far as I know, on their physical attributes. It is now several years since that this city was excited by the trial before a master in lunacy of a young man whose ability to manage his affairs was doubted. The author of "Ten Thousand a Year" presided at the trial. Experts on both sides gave evidence on the psychological condition. The late Lord Cairns (then Sir Hugh) was the advocate for the youth, and he argued strongly that the error had been fallen into of supposing this young man was feeble-minded because he had a high arched palate, and in other ways a deformed mouth, so that his defective utterances had given rise to the opinion that he was deficient in mental power. From the material I had collected I wrote a paper for the "Lancet" to show that, granted any suspicion of defective mental power, the deformation of the mouth, with its vaulted palate, was the strongest corroborative proof, a proof too of the congenital origin of his condition. My paper was too late to enable the opposite side to call me, and it could only be made use of in the opposing counsel's final address. The jury supported the doctrine of the liberty of the subject, and the poor congenital imbecile

was allowed to go his own way to destruction, with the result of becoming speedily bankrupt in fortune, ruined in health, and a scandal to an honored ancestral name.

Still more recently, a youth on coming of age sought to obtain possession of his property. There was strong evidence brought as to his conduct being incompatible with mental capacity, and the physical deviations were confirmatory of the congenital character of the feeble-mindedness. The jury, however, decided by a small majority that he was capable of managing his own affairs, although they were equally divided as to his mental soundness. Within forty-eight hours he was in prison for gross criminal conduct, and he speedily terminated a career of infamy from want of legal protection, which the poor feeble-minded youth could not give to himself. In the cases I am describing the cranium is usually smaller than normal, dolichocephalic in many but brachycephalic in the Mongolian type. Occasionally the head is scaphocephalic, the line of the sagittal suture giving a keel-like feature to what resembles an inverted boat. A very common character is a rapid shelving from the vertex posteriorly, corresponding to what is so frequently to be noticed, an arrest of development of the occipital lobe of the cerebrum. Not infrequently the cranium is extremely small, reverting to the Aztec type. These examples of extreme micro-cephalism have been attributed by Virchow to premature synostosis of the cranial sutures. I have found, however, that in some of the most marked members of the microcephalic group the sutures are well marked and every indication that the cranium had adapted itself to the cerebrum rather than that the cerebral mass had been dominated by the cranium. They are cases in which the brain and bony covering are both in miniature, the arrest having had an early intra-uterine date. It would be a grave error to imagine that there is an inverse relation between the size of the cranium and the intellectual capabilities of its possessor. I have known children with the most complete Aztec-like heads susceptible of some amount of education; they have been taught to talk, to discriminate, to take a real pleasure in the world around them, appreciate the jokes in a dramatic entertainment, and play intelligently with toys. I have under my care now one who has been taught to speak with discrimination, to say the conventional thing, to play on the piano

simple airs, to read story books with enjoyment, and to have a practical appreciation of right and wrong. They are usually mobile in temperament, sometimes very active physically, and always tractable, amiable, and appreciative of kindness. They illustrate the fact that there is such a thing as quality in brain-matter as well as quantity, and that the relative intelligence among feeble-minded children cannot be estimated simply by the tape and calipers. Macrocephalic crania are not infrequently met with, some being due to hydrocephalus, and others to an increase of the neuroglia of the cerebral mass. I have had patients under my care whose brains were within an ounce of the weight of that of Cuvier, who, nevertheless, were slow in their movements and slower in thought, and were perfect contrasts in intellectual sluggishness to the volatile microcephalic Aztecs with brains only one-fourth the weight. An inspection in these cases revealed the fact that the cineritious portion was pale and that the increased weight was due to the increase of the white substance, and especially of its connective-tissue elements. Another deformation met with in congenital feeble-mindedness is a marked asymmetricality of the two sides of the cranium. There is also in many an increase of the facial development as compared with the cranial. The ears are implanted farther back relatively than in normal heads. The eyes have their canthi too closely approximated in the dolichocephalic cases and too widely separated in the brachycephalic. The palpebral fissures are often narrow and obliquely placed, and the forehead is, not infrequently, corrugated in consequence of the employment of the occipito-frontalis muscle to raise the lid. At the inner canthi the integument often forms semilunar folds as if the skin were too scanty, which I have proposed to call epi-canthic folds. These are met with in people who are not feeble-minded, but they are more frequent in the latter and are, I believe, signs of degeneracy.

I have already referred to, and have elsewhere described in detail, the deformations of the mouth, which I regard as very important in the diagnosis of congenital idiocy. These views have been very generally adopted since I brought them under the notice of the profession. They have, however, been taken exception to in two different quarters and for different reasons. Dr. Kingsley, a distinguished dentist of New York,

did me the honor to say that he had come to England mainly to discuss with me the question and to see my cases. It was evident to me that he had not had an opportunity of studying the same kind of cases, and he stated that he had met with the palates I have described in people not feeble-minded. I am not the less convinced that they are signs of degeneracy, which, sooner or later, culminate in feeble-mindedness in the offspring, unless intermixed with a stronger strain. This view was confirmed by many members of the Odontological Society of London when I brought the subject before them. Mr. Keeling said "he had been induced to attend that meeting by the announcement of the paper to be read by Dr. Langdon Down. He had understood Dr. Down to ask for information respecting the gradual degeneration which might have taken place in the successive generations of the parents of imbecile children. He was in a position to afford such information. He knew the grandfather and mother of an imbecile child (the latter, he had reason to know, had been under the care of Dr. Down), and if the discussion were postponed he should be happy to produce the models of the mouths of the grandfather and the mother, and, perhaps, of the imbecile child's mouth also; and the models would show that a very marked and gradual deterioration of the palates and teeth had taken place in the mouths of the individuals referred to, from the grandfather to the imbecile child." Mr. Oakley Coles said that he "for some two years past had experimented upon the anatomy and physiology of the palate, and seemed to have been working side by side with Dr. Down. His results to a great extent confirmed those of that gentleman." The late Mr. Sercombe said, "Dr. Down's remarks about the high-vaulted palate and lunacy being commonly associated had much struck him, and brought to his mind the conditions of one of the oldest families in the realm, who were patients of his, in whom every branch of the family had remarkably high V-shaped palates, and at least two members of the family had been in confinement." The President of the Odontological Society, the late Mr. Mummery, said "that he had occasionally noticed, in cases where the mental power was deficient, the front teeth were not on the same plane as the molars," an observation I am able to confirm. I am the more desirous of placing these opinions of members of the dental profession

on record here because Dr. Kingsley, since his return to America, has read a paper "On the Development of the Teeth" before the Odontological Society of New York in which he reopens the question and makes statements which are not in harmony with my own experience. He says, "In meditating some time since upon the subject I came to the conclusion that, if my deductions were correct, I should find proof of it in an examination of sluggish or feeble intellect, and at that time I wrote this sentence: 'In an examination of idiots we shall be likely to find capacious jaws and teeth not crowded.' If a precocious or stimulated brain in infancy urges on and crowds the dental organs in advance of the growth of the jaws, then a brain of low calibre or power will be likely to have associated with it a retarded dentition, but with abundance of room. After this conclusion of my own," he says, "I came across a paper by Dr. Langdon Down. Dr. Down's statements, founded upon his observations of nearly a thouand feeble-minded patients, were so astounding, and so at variance with my theory, that the picture which I had painted seemed to vanish like a vision." Dr. Kingsley, however, visited an asylum for idiots upon Randall's Island in America, numbering about two hundred, and did not see a single pronounced case of V-shaped dental arch. On visiting my patients he says that "there was no mistaking the fact that there was a larger percentage of the kind of deformities which Dr. Down had described than I had found in any other collection of feeble-minded."

Dr. Kingsley attributes the exceptional condition of the patients to their being members of the higher orders of society, but the fact is that my first observations were made on poorer children at Earlswood.

An able physician in England, Dr. T. Claye Shaw, has tried to show that there are many idiots with well-formed mouths and palates, and with this I agree if he includes accidental and developmental cases. My contest is that they are typical of the congenital class, and one value attaching to these observations is that they often afford a means of differentiating the latter from the two former classes. Dr. Bourneville, of Paris, has carried on investigations on the same subject in France, and in a memoir has generally confirmed my views. Dr. Ireland, in his treatise of "Idiocy and Imbecility," says,

"Dr. T. Claye Shaw took the trouble to write a paper to prove that a highly-arched palate is not a sign of the existence of idiocy and imbecility; that a palatal investigation cannot afford a clue to the mental faculties. Dr. T. Claye Shaw's paper illustrates the confusion of mind one must fall into who studies the physical aspects of idiocy, while he persists in regarding it as a class incapable of further subdivision."

The feeble-minded have a tendency to become stout, with great development of adipose tissue; an example of this I related in the "London Hospital Reports" with the results of medication and diet.

Common sensation is generally much less acute than in ordinary persons. Pain is borne with wonderful callousness. It is not uncommon for children of this class to allow a thecal abscess to be opened with a scalpel without a grimace or without uttering a word. The same thing also applies to the extraction of teeth. This is quite in harmony with what may be expected; the hypersensitiveness of the cultured gentleman, as compared with the untutored ploughman, is matter of every-day observation, well illustrated in the case of the great Sir Robert Peel, whose sensitiveness cost him his life. Special sensation is also obtuse. Hearing is generally less acute, and this is often an important element in cases of delayed speech. We all know that absence of speech is often the outcome of complete deafness, but it is not sufficiently recognized that a very slight congenital defect of hearing is sufficient to cause deferred and defective speech.

Lesions of sight are very frequent. Congenital cataract is very commonly associated with congenital feeble-mindedness. Several cases have also come under my notice of blindness the result of arrested development of the globe. Strabismus is very common, and nystagmus, though less common, is not infrequent. Myopia, but especially hypermetropia, is a frequent accompaniment of congenital mental lesions. Color-blindness is occasionally met with, but it is difficult to say in how many cases it is from a want of mental power. The sense of smell is ill-developed in a great many and that of taste keeps company therewith. The most nauseous medicines are taken without question, and in fact with many its administration is regarded as a mark of attention and appreciated accordingly.

The muscular system is weak. Not only are physical efforts feeble, there is no power of sustained endurance. Co-ordination is defective and finely-adjusted movements are exceptional. There is a great tendency to automatism and rhythmical actions. Salaams, horizontal swayings, and rotations of the head and body are often met with. The lack of muscular power makes itself painfully manifest in a number of instances by the postponement of walking or even of standing. This is a symptom which brings children of this class under the notice of the physician or surgeon. The mother magnifies all the little manifestations of intelligence, but she cannot understand why the child does not walk. There may be no spastic rigidity, no contractures, and yet the little legs are powerless; they would seem to be unable to obey the behests of the will even were there any will exercising its proper domain. In the large number of notes which I possess of congenital feeble-minded children, walking delayed to the third or fourth year is a very common occurrence. Imperfect prehension with the upper extremities is also a frequent characteristic, and often the vertical position is rendered impossible by virtue of muscular weakness long after children of a similar age are running about.

There is still one important character with children of this class, which is a great cause of anxiety, viz., postponed or absent speech. I have, in describing the accidental forms of feeble-mindedness, referred to speech as a faculty which is frequently absent, and in the "developmental" class as a faculty which, having been once possessed, sometimes vanishes at special epochs.

In the class we are now considering delayed speech is universal, permanent absence less common. The lesion of speech in these cases is the outcome of several factors. The form of the mouth is, as I have shown, often abnormal. The high, narrow-vaulted palate presents a formidable difficulty; this is apt to be intensified by the ill-development of the lower jaw, the horizontal ramus forming too obtuse an angle with the ascending ramus, so that labials are expressed with difficulty. In addition to this the tongue is large, flabby, and defective in its muscular movements, and these are ill-co-ordinated. Again, the congenital defective hearing I have referred to is often another factor. Still further, there is too frequently the

potent cause of having no power to convert ideas into words, and, alas, the still more potent one of having no ideas to communicate.

I have thus, in the limited time at my disposal, endeavored to bring before you the prominent features of what I regard as the three great natural divisions of the sufferers from a grave calamity. Some of the causes which have produced it will occupy our time at our next meeting.

CHAPTER II.

THE causes of idiocy or feeble-mindedness will always attract a good deal of attention, and will doubtless, as heretofore, lead to much speculative opinion. It will be obvious from the classification on which I have insisted that the causes vary in their nature and their date, in the three great divisions to which I have referred. In the "accidental" variety there is usually not much difficulty in arriving at the cause. The history, as a rule, elucidates the matter. Some are from injury received at birth by necessary instrumental interference, but it is very remarkable how few are sacrificed from this cause. Many years ago, when I was assistant to the late Dr. Ramsbotham, I remember his telling me that the cases were very few in which he could trace any cerebral lesion as resulting from the employment of the forceps, and he must have known many instances where the forceps, and especially the long forceps, had been applied less dexterously than they would have been by his marvellously-accomplished hands. During the later years of Dr. Ramsbotham's life I took great pains to investigate the subject, and my results were greatly in accord with his assertion.

I found that among the great number of feeble-minded children about whom I could get thoroughly reliable accounts, in only three per cent, including members of the three great classes, had the forceps or any other instrument been employed. It is probable, therefore, that in nine per cent of purely accidental cases instrumental interference might have been the principal factor. Far more important, however, in the production of accidental cases, is the prolonged transmission of the child in the maternal passages. In the preparation of a paper for the Obstetrical Society of London I called attention to the fact that in so large a proportion as twenty per cent of all idiots whose history I had investigated, there was an undoubted account of suspended animation at birth—a suspension requiring active efforts to bring about resuscita-

tion. I believe that the members of our profession who have given attention to deformities among children could say how very frequently suspended animation at birth is associated with the contractures and other lesions which they are called upon to treat.

This cause is more frequently met with in first-born children, for the very obvious reason that the transit of the child is more likely to be delayed to a perilous extent by the smallness of the internal passages and the rigidity of the perineum usually associated with a primiparous birth. Ergot of rye, when administered to the mother during the parturient hours, has been thought to be a cause of accidental idiocy, but the result of my inquiries has been to establish in my mind a verdict of "not proven." In many of the cases in which ergot has been employed, the very condition for which it was used, viz., delayed transit of the child, has been the cause of the evil rather than the agent which was intended to hasten the birth. Moreover, it is extremely difficult to obtain from the mother any information of what was or what was not administered during the period of her peril. The outcome of these remarks is, I think, to show that, independently of what concerns the safety of the mother, mental and physical evil to the child is more likely to be induced by prolonged pressure and a delayed use of instruments than by the early and adroit employment of agents likely to hasten the birth.

Insolation in infancy is certainly a cause of accidental idiocy. It has fallen to my lot to see a notable number of feeble-minded children who owe their disaster to sunstroke while making the passage of the Red Sea and Suez Canal *en route* from India, or from exposure in that country. I have at the present time under my care a very good example. There is every reason to regard the case as an accidental one, having reference to the history and the physical configuration of the child, while the mental decadence dates without question from the period when exposure was unavoidable.

The administration of opium by nurses to keep their charges quiet is often regarded by parents as a possible cause of their little one's defect. From the nature of the case it is very difficult to prove the administration of the drug, and even if that be proved, to associate it with the lesion. I am led to regard this as a very infrequent cause of accidental idiocy, inasmuch

as the majority of the cases, where strong assertions have been made as to the furtive administration of the medicament, have in their persons indubitable evidence of the congenital nature of the malady, and, moreover, evidence usually that the cause must be traced far back in intra-uterine life. Much more tangible as a cause is morbid sexual erethism, too often induced by nurses who procure the quietness of their charge by means which, even if the mental health is not sacrificed, lead eventually to grave moral delinquencies. A not insignificant portion, however, break down, and mental hebetude becomes their lot. I would impress on you strongly my conviction that this evil has a very early significance, and the probability of the occurrence must always be kept in view.

Traumatic injury to the cranium from falls may be, and doubtless is, a cause of accidental idiocy. It is readily conceivable that injuries of this kind may prove harmful immediately by concussion or later on by secondary lesions of the brain and its membranes. I am persuaded, however, that it is not so common as a cursory consideration might lead one to believe. A large number of cases are referred by the mothers to falls or suspected falls, the objective evidence of which is entirely opposed to such a theory, cases in which the congenital nature of the affection is beyond dispute. Traumatic causes like opium drugging are, I am convinced, but rarely factors in the production of feeble-mindedness.

Meningitis, on the other hand, very frequently leads to this variety of idiocy. A large number of cases of accidental idiocy have somewhat of this history. They have been born with undoubted intelligence; they have contracted scarlatina, measles, or small-pox; this has been followed by inflammation of the ear with extension to the membranes of the brain, or the otitis may be set up by catarrh, the inflammatory action extending from the outer to the middle ear or from the pharynx by means of the Eustachian tube. Whatever the origin, death does not always take place, the little sufferer undergeos a perilous illness with violent convulsions, and, escaping with life, is not infrequently left in a condition of mental feebleness. I have made many autopsies in which there was evidence of a long past inflammatory process and in which there was a probability that the anæmic condition of the cerebral convo-

lutions had for a cause the constringing effect on the vessels, of organized lymph at the base of the brain.

Epileptiform convulsions, whether eclampsic or not, frequently cause accidental idiocy. These may be induced by peripheral irritation of any kind, and, as Dr. West has pointed out in his suggestive and elegant Lumleian lectures, "be the cause what it may by which the fit is first excited, a paroxysm of whooping-cough or the irritation of thread-worms—something which would seem most temporary in its character and furthest removed from any abiding influence on the higher endowments of the nervous system, it yet leaves behind a mark, a stamp, a stain, not unlike what theologians tell us of the flaw which our first parents' sin has left upon our moral nature—a predisposition in short to a great evil." It is, however, in the kind of idiocy which I have termed "developmental" that the results of epileptiform convulsions are the most manifest.

Hydrocephalus is also an occasional cause of accidental idiocy, more frequently, however, of the congenital variety. I have had under my care a few cases where the hydrocephalus became developed after birth and lessened or destroyed the intellectual faculties of the child.

Paralysis arising from cerebral hemorrhage occurs as a cause of accidental as well as congenital idiocy. The amount of intellectual defect varies greatly, some cases are very amenable to instruction while others fail to respond to the efforts made for their benefit. In one case under my care the patient has been taught to play the violin fairly well, well enough to give him great pleasure, using the right hand instead of the left for fingering.

We now come to the causes of developmental idiocy, and I would first mention the maternal health during pregnancy, which is, I am convinced, a very potent factor in the production of that kind of idiocy which I have named "developmental," especially is it so if the deviation takes place during the sixth or seventh month.

The causes which, occurring early in the embryonic life of the child produce congenital, operating later produce developmental idiocy, by which I mean, as I explained in the first chapter, children born with intelligence but whose nervous and intellectual system breaks down at one or other of the developmental epochs.

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history of physical or psychical decadence from one or other of the progenitors. But even where there was no evidence of gross departure from a normal standard, one could not fail to notice frequently cranial and other signs of racial degeneration, such as narrow palates, rabbit mouths, bad foreheads, and facial exaggerations. The causes of idiocy are not always operative in a single generation, and it is only by having the opportunity of examining into the physical conformation of parents and grandparents that one can see that idiocy in many cases is the culmination in the individual of a gradual degenerative process. Even with all the care I have taken in the investigation I can only hope that my results are approximately correct. There is much difficulty in getting the information one needs on account of mistakes respecting the import of one's questions, and there are still further difficulties among those whose education would enable them to appreciate the inquiries made, owing to a desire on their part to keep in the background many points which would have a very important bearing on the problem. I have often found it useful to interrogate the parents separately, and have in this way obtained very useful data, each one in turn being not unwilling to supply all the facts which would appear to point to something in the opposite family as the potential cause of the affliction. I have endeavored in such investigations to keep myself free from the bias of former statistics, especially those of the late Dr. Howe, of Massachusetts.

It had been a matter of speculation with me whether great disparity of age of the parents was not likely to be a cause, and strength was given to this supposition by a few remarkable cases which came under my observation—cases where the disparity was very great and where there was feeble-mindedness in the offspring. On making inquiries, however, over a large field, I was led to results which, though interesting, did not tend to confirm the speculative opinions I at first entertained. I found that the average age of the fathers of feeble-minded children at their birth was $35\frac{8}{12}$, and that of the mothers $31\frac{6}{12}$; a disparity of only $4\frac{2}{12}$ years. On looking about for some standard of comparison I met with Mr. Galton's statistics on the ages of the parents of men of scientific attainments at the period of their children's birth. Mr. Galton states that their fathers average 36, and their mothers 30 years. With

reference to the ages of the fathers in whose case we should naturally look for the potential cause there is a remarkable similarity, the advantage being on the side of the procreator of feeble-minded children to the extent of $\frac{4}{12}$ of a year, while there is less disparity of age among the parents of the feeble-minded than among the parents of men of prominent ability. The difference being six years in the case of Mr. Galton's selected men's parents as against $4\frac{8}{12}$ in the case of the parents of afflicted ones. It is clear, therefore, that disparity of age of the parents, although doubtless having an important influence on the well-being of the offspring, does not rank as an important factor in the production of idiocy.

It is worthy of remark that only 20 per cent of the mothers gave birth to idiots at the age which Aristotle regarded as the most suitable one for a vigorous progeny, viz., between thirty and thirty-four. Whereas, according to Mr. Galton, no less than 34 per cent of men of eminence are given birth to by their mothers at that age.

In a paper contributed to the Obstetrical Society of London I have indicated that there is a greater liability to idiocy among primiparous children; 24 per cent of the 2,000 idiots examined by me being first-born children. I found that seven was the average number of living children born to those parents who have had an idiot child, prolific child-bearing rather than the opposite appearing to be the characteristic of people begetting feeble-minded children. I ventured to suggest that the preponderance of idiocy in first-born children might be due to the exalted emotional life of the father and mother as well as to the increased difficulties of parturition, and to the attendant greater risk of suspended animation to which I have already referred. Curiously enough, while 24 per cent of idiots generally are primiparæ no less than 40 per cent of resuscitated idiots come under this category. I have long held and taught the opinion that suspension of animation must be regarded as one of the pre-efficients of idiocy.

I do not find that the production of twins is a very appreciable cause of idiocy. Two per cent only of my collection were twins, while, on the other hand, in 2 per cent of my cases the mothers had given birth to twins who were not afflicted in any way.

I am aware that this opinion is rather different from that

entertained by Dr. Arthur Mitchell, C.B. His statistics on the subject are somewhat different from mine. His observations were made in Scotland, and while I find that one in fifty idiots is one of twins, he found one in forty to come under this category. Having regard to the greater tendency to abnormal presentations, to the increased necessity for instrumental interference, and the greater liability to premature birth, I was prepared to expect a much larger number of idiots to have been twin children.

From what I have previously said it will be seen that I attach immense importance to the emotional life of the mother during the period of pregnancy, and I feel convinced it is one of the most potent of all the pre-efficients of idiocy. In 32 per cent of my cases there was a well-ascertained history of great mental disturbance on the part of the mother at that time. My ever-to-be-revered teacher, the late Dr. W. B. Carpenter, relates how at the siege of Landau in the year 1793, in addition to a violent cannonading, which kept the women in a constant state of alarm, the arsenal blew up with a terrific explosion, which few could bear with unshaken nerves. Out of 92 children born in that district within a few months afterward 16 died at the time of birth, 33 languished from eight to ten months and then died, 8 became idiots and died before the age of five years, and 2 came into the world with numerous fractures of the bones of the limbs, probably caused by irregular uterine contractions. I can from my own experience refer to the number of cases of feeble-mindedness which were the outcome of the siege of Lucknow, and in many others the result of sudden shocks from the receipt of distressing tidings of death or other calamities.

Another element in the etiology of idiocy is the physical health of the mother during the period of pregnancy. In 20 per cent of my cases there was marked physical disturbance. In 4 per cent of these there was a history of serious falls, falls from which uterine hemorrhage followed; the other cases were those in which there was prolonged ill-health and in which vomiting was a prominent symptom. They were all such events or ailments as would be likely to interfere with the nutritive life of the embryo.

By far the most potent influence in the production of idiocy is the general physical and mental health of the progenitors.

This I have already touched upon in speaking of heredity. One cannot fail to be struck by the nature of the stock from which such patients have sprung, and one has not far to seek for most potent causes. If, after a perusal of Mr. Galton's statistics of the antecedents of men of science, we compare the antecedents of my 2,000 cases, the contrast is so great that all wonder at the production of mental feebleness vanishes. With fathers phthisical and irascible, with mothers feeble in judgment and so emotional that everything is a cause of fright, one is astonished that they should have procreated any sane child at all, and, indeed, in some cases the whole progeny of these parents is puny and feeble, failing to perform social duties. I find that in 16 per cent of the cases there was insanity or marked feeble-mindedness on the father's side of the family, and in 15 per cent there was the same condition on the mother's side. Severe emotional disturbance, bordering on insanity, occurred in 4 per cent of the fathers, while a like affection in the mothers occurred in 13 per cent. These cases of emotional disturbance were very marked. Some of uncontrollable passion, ill-regulated grief, or morbid sentiment; others where clergymen had given up their cures through needless fear of stopping in the middle of their sermons; others, again, where ruin had been brought about by alienation of friends or ill-regulated lives.

I have found it very difficult to get at reliable statements with regard to the influence of alcoholic intemperance. There is not only a desire to conceal the fact, but there is evidently such an elastic gauge as to what constitutes intemperance that my numbers must be regarded as much within the truth. There was, however, avowed and notorious intemperance in 12 per cent of the fathers and 2 per cent of the mothers. I found, however, that the proportion varied extremely with the stratum of society from which my records were taken. In the members of the upper ranks in the social scale it was an insignificant factor, while when the inquiries related to the lower social class it became a factor of great importance, and in fact there appeared to be a gradually increasing percentage as the lowest stratum was reached.

I feel quite sure that drunkenness must be placed among the factors in the production of idiocy. I have had under my observation several families in which the majority of the chil-

dren were mentally feeble, and the whole more or less fatuous, whose fathers were never very drunk yet never perfectly sober, and in these cases the chronic alcoholism had produced a condition of mental hebetude from the slow poisoning to which they were subjected.

Some of the cases are the result of slow deterioration of the father's mental and physical powers, others are the result of procreation having taken place during a debauch. I have elsewhere called attention to cases of idiocy resulting from well-authenticated instances, where procreation could only have occurred under such a condition. Such cases have a close family likeness to each other. Dr. Elam states in "A Physician's Problem," that on the removal of the spirit duty in Norway insanity increased 50 per cent and congenital idiocy 150 per cent. Mr. Huth quotes from Dr. Lannurien, of Morlaix in Bretagne, where he says: "I do not hesitate to attribute the greater number of cases of idiocy in this establishment to that cause," viz., alcoholism. I certainly cannot bear that out by my experience in England. Some years since, when I expressed my conviction that acute alcoholism produced a distinct form of idiocy, it was received with some questioning. I had, however, found, from conversation with M. Morel, of Rouen, that he had noticed similar facts. Dr. Ruez has observed that idiocy was very common among the miners of Westphalia, who, living apart from their wives, only came home, and generally got drunk, on their holidays. M. Demeaux has also recorded parallel cases. Dr. Delasiauve says that in the village of Carême, whose riches were its vineyards, the inhabitants were forced to be a little more sober in consequence of ten years' vine disease. This, he says, had a sensible effect in diminishing the cases of idiocy. Demeaux assured himself that of thirty-six epileptic patients he had under his observation for twelve years, and whose history he was able to trace, five were conceived in drunkenness. He observed two children of the same family suffering from congenital paraplegia whose conception also took place while the father was drunk.

I am not aware that any observations have been made with reference to the relation of malignant disease to idiocy, nor do I wish to attach more importance to it than it deserves. Nevertheless it is interesting to notice that 3 per cent of the

fathers and 5 per cent of the mothers, in all 8 per cent of the progenitors, died from cancer. Goître occurred in 2 per cent of the mothers, but not once in a father.

I have made a very careful examination as to the relation of syphilis to idiocy, and my later inquiries have confirmed the opinion I have long taught, that syphilis is not an important factor in the production of idiocy. In not more than 2 per cent are there signs of inherited syphilis. In making my investigations I have availed myself of the valuable observations made some years since by my friend and colleague Mr. Hutchinson, to whom the profession of medicine owes so much for his original researches. Dr. Shuttleworth confirms my opinion from investigation in another field.

I met with a history of epilepsy in 3 per cent of the fathers and in 6 per cent of the mothers. Phthisis exercises a very important influence among the progenitors. Several years ago I called the attention of the profession to this circumstance, and endeavored to show that the peculiar form of idiocy to which I referred in my previous lecture as the Mongolian type was the outcome of a predominance of phthisis, and that it included about 10 per cent of all idiots. I find that there is a marked history of this disease in 25 per cent of the fathers or their immediate relatives, and the same thing occurs in 20 per cent of the mothers.

In 23 per cent of the cases there was a history of idiocy, mental feebleness, insanity, or other grave neurosis in one or several of the brothers and sisters.

I have already alluded to the influence of the emotional life of the mother on the embryo, but I have also a large mass of evidence tending to show that just as intemperance at the time of procreation may eventuate in degenerate offspring, so various kinds of mental perturbation of the father at that time may so result. I have, for example, several instances of the father begetting healthy children, except when he was the subject of recurrent mania, when idiocy resulted to the children conceived at that time. In like manner I have examples of healthy children being produced except when the merchant's business speculations have been hazardous, when the clergyman's parish has been disturbed, or the dissenting minister's church meetings have been stormy.

There are many facts which tend to indicate that the men-

tal condition of the embryo takes its impression from the mental condition of the father at conception, and that there is a markedly varying potentiality in the sperm-cell.

It would be a very interesting question to determine how far various trades and professions were allied with idiot offspring. I have carefully investigated the matter but have arrived at the conviction that I could not, from my cases, although very numerous, draw any very safe deductions. My patients have come from all parts of the British dominions, and include every variety of social rank, but still I am conscious that a very unfair proportion must have been drawn from this great city, that although I may have accumulated a fair number of histories from agricultural, I am sure there is a deficiency of a due proportion of cases from manufacturing districts, the great bulk having come from the southern counties of England and only a small proportion having come to me from the great manufacturing centres. I therefore feel I am unable to draw any very safe deductions with regard to the influence of employments generally in the production of, or alliance with, feeble-mindedness. Still there is a possibility of comparing the relative association of this affliction with the different professional classes, and especially with what are termed the three learned professions.

I have collected from my notes four hundred cases with fair social antecedents, and I find that 75 per cent are the children of merchants, country gentlemen, officers in the army and navy, gentlemen of independent means and liberal education, and members of the titled aristocracy. No less a proportion than 25 per cent are the children of members of one or other of the three learned professions, a proportion which I take to be extremely large. On analyzing still further the cases supplied by these three professions, I find that 3 per cent are the children of lawyers while 4 per cent are the children of members of my own profession. The remarkable circumstance, however, in the investigation is that no less than 18 per cent are the children of members of the clerical profession. Mr. Galton has made some interesting investigations from an opposite standpoint. He takes the members of the councils of some of the prominent scientific societies of London, such as the Royal, the Linnæan, the Geological, etc., and makes the very fair inference that the 100 members of the councils of

such societies may be taken to be men of marked scientific attainments and of intellectual prowess. He inquires into the various professions of the men who have had such representative offshoots. He finds that the legal profession, which, according to my statistics, procreates fewest idiots, gives birth to 11 per cent of the foremost men of eminence; that the medical profession with its 4 per cent of idiots, gives origin to only 9 per cent of scientific men, while the clergy, who have the maximum amount of idiocy, give birth to only 6 per cent of men of science. In other words, while lawyers give origin to nearly three times as many scientific men as do the clergy, the clergy, on the other hand, beget six times as many feeble-minded children as do lawyers. Now, I venture to suggest that there is more than a mere accident in this. I bring it forward because, interesting in itself, it is also interesting in the support it gives to the theory that a process of natural selection has been taking place.

The life of the lawyer is such as to aggregate to that profession men of strong resolve, of mental and physical vigor, men who must be conscious that it is an avocation in which they must bring to their aid an imperturbable will and a good digestion. In the medical profession there is a larger average of moderate success. The race is not so urgent and the claims not so imperious; an aggregation of feebler elements is likely to ensue. But in the clerical profession a moderate success is still more insured, and there is less claim among the rank and file for great mental and physical exertion. It is a profession which draws toward it many good men, but whose goodness need not be the outcome of great mental or physical power. Moreover, when once within the boundary of the Church, their usefulness and success may be in direct proportion to their retirement from intellectual turmoil, and to their assiduous cultivation of the amenities of life. It is a profession which, by its very gentleness, is likely to draw to its inclosure less the powerful will, the vigorous thought, and the ratiocinative brain, than those with bodies weak and emotions strong; men who may be classed as gently good rather than as grandly great.

The influence of marriage of consanguinity on the production of idiocy has engaged much consideration. There is a strong popular bias in favor of the theory that marriages of

consanguinity are an unmixed evil, and that they are always subversive of physical and mental perfection. Mr. Huth has, however, in his classical work on the marriages of near kin, brought an amount of evidence on the other side of the question which should make us hesitate before we dogmatize on the subject.

About twenty years since I investigated the matter, and have ever since kept it prominently before me. I must confess that I approached the question with a strong bias in favor of the popular opinion. My inquiries, however, led me to see that the whole subject was worthy of reconsideration. The data on which accurate calculations can be made are unfortunately wanting, inasmuch as there is great uncertainty as to the number of people born who are the children of first cousins. I hope that at the next census this may be remedied, and that we may have reliable information on which to build more conclusive arguments. We want to know how many healthy and capable people, men and women who are doing the world's work, are the children of cousins, before we can determine what, if any, influence the marriage of cousins has in producing mental feebleness. In the absence of such data I made inquiries among the out-patients at the London Hospital, and found 0.5 per cent only were the children of cousins. It is true that my area was a limited one, and it is possible that the percentage is a low one. However, the people I did meet with who claimed to be the product of consanguineous marriages were wonderfully fine specimens of humanity. They were, as a whole, really above the average in physique and vigor. I made similar investigations among the employees in an institution, and found approximately the same result. Other inquirers, however, have made their results rather higher, and have therefore, in like proportion weakened the argument against consanguineous unions. Thus, M. Boudin, using the French official returns from 1853 to 1859 inclusive, says that of every 100 mixed marriages, there were 9 consanguineous, while from another official return of marriages in France in the years 1863 to 1865, of every 100 mixed marriages 1.28 were consanguineous. M. Dalby has shown that having regard to the records obtained in the offices of the Mairie at Paris, that the results obtained both by M. Boudin and myself are probably too low, and that 1.4 per cent is the

proportion of consanguineous marriages in Paris, a larger percentage than that derived from the official returns of France generally. Mr. George Darwin, in a paper read before the Statistical Society, endeavors to arrive at approximate results by a calculation based on the numbers of same-name marriages, and comes to the conclusion that the ratio of consanguineous marriages in London is 1.5 per cent and in country districts 2.75 per cent. Having regard, therefore, to results arrived at by different observers, I think that until we have more authoritative data, 1 per cent may be taken as the percentage of marriage of first cousins. Dr. Arthur Mitchell, C.B., estimates them, at a rough guess, on the basis of his inquiries in Scotland at 1.5 per cent.

Mr. Huth marshals a great many facts to prove the position which he takes. He has no difficulty in appealing to the early history of the world to show that consanguineous marriages were the rule. Close intermarriage was practised by the great founders of the Hebrew race. Among the ancient Egyptians and Persians he indicates that incestuous marriages were common in the kings and people of high rank without apparently any evil result, and he shows by numberless appeals to Athenian and Spartan history how frequent, and yet how harmless, was marriage of near-of-kin. The whole question has been discussed with an amount of partisanship, which is very remarkable. One disputant goes so far as to attribute hydatids in the liver to consanguineous unions, others again charge to marriages of near kin "organic degeneration fatal to the propagation of the species."

Dr. Shuttleworth has recently published a paper on the subject, in which he discusses the question with marked moderation. His statistics, gathered in the north of England, are slightly different from mine, gathered in the south, and are on the surface less significant of the danger of the unions we are discussing than were mine. Although I have no doubt of the care with which Dr. Shuttleworth's cases were taken, there is always a danger of the friends not appreciating the question, or of desiring to conceal the relationship, and so making the percentage of births from the union of cousins too low. They are not so likely to exaggerate the percentage by the assertion of a relationship which does not exist. In a careful examination of 852 cases of known parentage I found that 60

were children of consanguineous marriages, or at the rate of 7 per cent, while among these 46, or 5.4 per cent, were first cousins. Dr. Shuttleworth, in analyzing 900 cases, found that 5.1 per cent were consanguineous marriages, and of these 2.9 per cent first-cousin marriages. While Dr. Shuttleworth finds that 5 is the average number of children born to relatives who have intermarried, I find that the average number of children born under like circumstances is 6.9. It will be observed that the latter figures are not far removed from the average of my 2,000 cases, which is 7, so that there is not much to be said as to consanguineous marriages being less prolific than others. I am conscious, moreover, in considering my statistics and those of Dr. Shuttleworth, that I am comparing things which are not the same; his cases do not include epileptic children, whereas mine do. This may account in some measure for the disparity. Since I wrote on the subject twenty years ago I have continued making observations, and have no reason to materially alter the percentages at which I then arrived. I have recently gone over the notes of 400 fresh cases; they have been taken with great care, and I am certain that no error has crept in. Of the 400, 26 were children of consanguineous unions, or 6½ per cent, a difference so small as rather to confirm the value of my statistics on the larger number. Nineteen of these were the children of first counsins, or 4.75 per cent; 6 were children of second cousins, and 1 of third. When I came to analyze my cases further I was struck with the obvious causes of their feeble-mindedness, other than the marriage of near kin, which the notes of my cases brought to light. I took out of my portfolio 20 unselected cases, and on examining the life-history of their progenitors, I found that in 1 only was the consanguinity of the parents the only discoverable factor. I am convinced that frequently the absence of investigation into the other possible factors has led to such contradictory opinions on this subject. Take an illustration from my notes culled by chance from my portfolio.

J. T. W., born in the parish of St. Luke's, 1866. His father is a lever-escapement maker, his mother worked as a tailoress before her marriage. Father always subject to headache and to dizziness, frequently to fainting. Mother dreadfully nervous; her uncle died insane; had a cousin imbecile; the grandmother also was extremely nervous.

He is the first-born child and had five brothers; two have died, one from a fit during whooping-cough, and the other from bronchitis; one of those living is paralyzed; another, three years and five months old, cannot talk. His father fell down in a fainting fit (epilepsy?) which frightened his mother very much when five months advanced in pregnancy and brought on uterine hemorrhage. We read further that the father and mother were first cousins, but it is absurd to suppose that this was the most important factor in the production of the child's idiocy. No one could contemplate the union of two such persons, whether related or not, without predicting disastrous results to their progeny. Although looked at superficially my statistics are rather less favorable to the marriage of first cousins than are those of many other observers, I am strongly of opinion that, having regard to the remarkable antecedent neurotic history of the first cousins who have married and procreated feeble-minded children, the evil apparently resulting is that where there is hereditary predisposition the intermarriage of relations determines the concurrence of two morbid factors, and this may account for the undoubted greater frequency of feeble-minded children among the progeny of cousins than among those of mixed marriages. My views are quite in harmony with those of Dr. Charles Withington, who regards morbid inheritance rather than specific degenerative tendencies as accounting for all infirmities met with in the offspring of cousins.

It is interesting to note that Dr. Kerlin, of Pennsylvania, a remarkably accurate observer, arrives at precisely the same conclusion as I have, that 7 per cent of feeble-minded people are the children of consanguineous marriages.

Dr. Voisin made a careful examination of 1,077 of his patients at Bicêtre and Salpêtrière, and in no instance could healthy consanguinity be regarded as the cause of idiocy, epilepsy, or insanity.

I have thus endeavored to show that while the marriage of cousins insures a degenerate offspring where there is something morbid in the family history—where phthisis, scrofula, and especially the neuroses exist, I am by no means sure that by a judicious selection of cousins the race might not be improved. Dr. Clouston thinks there seems to be a special tendency for members of neurotic families to intermarry, and

that an affective affinity among such tends to love and marriage. I must say that my experience, on the contrary, would rather lead me to agree with Mr. Grant Allen that "what we each fall in love with individually, is our moral, mental, and physical complement." The intermarriage of cousins arises in all probability from their seeing and knowing more of one another, without committing themselves to an engagement, than can be possible in ordinary life. Other things being equal, I cannot but believe that the physiological law is more usually followed, seeking our unlike and our opposite. However that may be, there is no strong argument, in my opinion, to be based on an inquiry into the etiology of idiocy in favor of the doctrine that consanguinity *per se* is an important factor in the production of the evil, and that this doctrine is held is shown by the writings of Devay, of Lyons, who asserted "that in pure consanguinity, isolated from all circumstances of hereditary disease, resides, *ipso facto*, a principle of organic vitiation." Commencing the investigation twenty years ago, and continuing it up to the present time, I am able to agree with Dr. Shuttleworth, that if a close scrutiny does not reveal any hereditary weakness, neurotic or otherwise, the facts and figures alone will not in all instances justify us in "forbidding the banns."

Illegitimacy has been regarded as a cause of idiocy. Dr. Arthur Mitchell, from statistics taken in Scotland, where illegitimacy appears to be frequent, came to the conclusion that it is a very common cause. He supports the probability of this by reference to the superior viability of legitimate as compared with illegitimate children. Thus at Berlin every twenty-fifth child of the legitimate and every twelfth child of the illegitimate were stillborn, and after birth the mortality of the legitimate before the age of five years is to that of the illegitimate as 6 to 3.

I cannot but think that these statistics are open to another explanation. My own investigations do not throw much light on the subject, because my 2,000 cases are mainly from children born in wedlock, the illegitimate cases finding their way into the workhouses. Among the few that have come under my notice where there was reason to suspect their legitimacy, there has been enough in the anxieties of the mother's position to account for the disaster. With the prospect of giving

birth to a child with a compromised position one cannot wonder that the agony of mind incident to it, should arrest the development of the embryo and give rise either to congenital or developmental idiocy. I am quite prepared, therefore, to expect that in a different class than that from which my statistics are drawn illegitimacy may be a potent emotional factor.

Attempts to produce abortion have been also regarded as a cause, and it is possible that this may be one among others to add to the numbers of feeble-minded children the outcome of illegitimacy. I am, however, not able from my personal experience to confirm or negative the statement.

Idiocy is occasionally induced by deprivation of the senses. The case of Laura Bridgman (although not an idiot) has become known wherever the English language is spoken, as a triumph of the perseverance of the late Dr. Howe over difficulties which seemed insurmountable. I have had one such example under my care. The subject of the deprivation was a boy who could neither see, hear, nor speak, and this deprivation was from birth. He had a very acute sense of touch and that of smell was equally good. He knew by their odor all those who were brought into daily relation with him, and caressed lovingly those who ministered to his wants in the way of food and warmth. Attempts were made to teach him to associate actions with things, especially articles of food. I tried to teach him a sign for sugar (of which he was very fond) by the movement of the hand in a vertical direction, but without success, although it was repeated again and again with most persevering efforts. It was, unfortunately, a case in which there was a damaged cerebrum, and he became epileptic. It was most remarkable, however, how at once he smelled out his friends and manifested by a smile his consciousness of their proximity. That smile was always a reproof to us, who had full possession of our senses, for our occasional petulance at things of minor import, while this deprived boy never whined but appeared delighted at the most insignificant creature comforts.

There is a very important class of cases which owes its origin to malaria or other endemic causes, and which is called cretinism. A great deal of attention has been given to this disease, and I have had the opportunity of studying it myself

in the Italian Valley of Aosta. Here I found it in greater profusion than in any of the valleys of the Bavarian or Swiss Alps. The fact that cretinism is not confined to the valleys of mountainous regions but is found also along the course of the great rivers, suggests the probability of its having a malarial origin. Every variety of theory has been resorted to, from the presence of iron in the water to the presence of magnesia. Cretinism is not unknown in England, and has been found in Derbyshire and some parts of Yorkshire, I have seen several cases coming from one part of Somersetshire, not to be distinguished in their general features from those met with in the Swiss and Italian valleys. Virchow and Zillner both trace a connection between marsh fever and acute affections of the thyroid gland. Certain it is that, while the goitrous people are not necessarily cretins, the race tends by a process of gradual deterioration to cretinism. A large number of cretins met with in the Valley of Aosta were not goitrous in the least degree, but their grandparents, who were not cretins, had enormous thyroid glands and the peculiar tawny look which is characteristic of cretinism as well as of paludal poisoning. Cretinism is, however, met with in England sporadically. My colleague, Mr. T. B. Curling, was the first to call the attention of the profession to these cases, in the year 1850. Without having been aware of his paper I brought a case before the Pathological Society in 1869, having had cases under my observation from the year 1860. I have now had altogether twelve sporadic cretins under my care, and in the majority there was reason to believe that they were procreated during the intemperance of the father, some of the later ones could not have been procreated under any other condition. They all had a very great resemblance to each other, most of them had their growth arrested at the period of first dentition, in three of the number, however, growth was not arrested until the period of second dentition. They all had two characteristics; there was no evidence of the presence of a thyroid gland, and they all had puffy swellings, which Mr. Curling showed to be fatty, in the supraclavicular spaces. In a case I have recently had under my care, and who died a few months since from tubercular meningitis, the supraclavicular swellings entirely disappeared before death. Apparently it was a reserve stock of fatty material, which

vanished with the general emaciation. The characteristics of these children are their extreme placidity, they are unruffled in temper, seldom cry, never shed tears. They are imitative and have a strong sense of humor. Their speech is usually deferred, and when acquired is monosyllabic. They are orderly and precise, disturbed by anything out of the usual routine. Their skin has a wrinkled appearance, as if too large for their diminutive bodies. Their faces have an earthy color. The hair is commonly sparse, and they suffer from pityriasis of the scalp. They have usually a large development of areolar tissue, and two of my cases were characterized by polysarcia, one weighing 210 pounds.

Three of my twelve cases were males, nine were females. They all had brachycephalic crania, flattened noses, and the distances of the inner canthi exaggerated. Their tongues were large for their mouths, and their lips were thick. There was in the majority a tendency to suck their tongues. In three only was there much intellectual response to teaching. They were all, however, with one exception, readily taught to be clean in their habits, making signs to indicate their natural wants. Menstruation had not appeared even in those who had reached the years of womanhood, and the external organs of generation were infantile in appearance, and apparently there was complete absence of sexual instinct.

In the year 1857, M. Baillarger presented a case of sporadic cretinism before the Société Medico-Psychologique of Paris, and described it as a very remarkable one. It is a girl, he said, born at Melun, of healthy and well-formed parents. The first dentition was completed at three years of age, and it was then that general development was arrested. The girl is now about twenty-seven, and she has the intelligence and tastes of a child of four or five; she plays with a doll, and has no sentiments of modesty. After describing the characteristics of the case, which resemble very closely those which I have detailed as being common to mine, he goes on to say that the body is fat, the limbs thick and short and sufficiently regular; the second dentition only commenced at eighteen, and has not yet terminated. The pubis is smooth, the mammary glands rudimentary; menstruation has not been established, and there has never been any sexual sensation. M. Baillarger throws out the suggestion that the condition of this case, and of an-

other that he had seen in Paris with M. Rayer, arose from inactivity of the generative organs.

The relation between goître and cretinism is of extreme interest. The late Dr. Hilton Fagge in 1871 regarded goitre and cretinism to be antagonistic effects of the same cause. He suggested that when the cause acts with little intensity the sole effect is goitre, but if it acts with great intensity or upon successive generations it at length produces cretinism as well as goitre. The not infrequent absence of goitre in cretins, when not dependent upon congenital deficiency of the thyroid body, must, he thought, be attributable to some local morbid change in it, by which it is prevented from undergoing enlargement under the operation of the morbific agent. He suggested that when goitre has existed in a family for two or three generations, the structure of the thyroid body may undergo deterioration in members of the succeeding generation. When we have regard to the remarkable cases of cretinoïd changes in adult women described so well by Sir William Gull, and the many examples which have been since accumulated by many observers, and especially by Dr. Ord and Sir Dyce Duckworth, we cannot fail to see the close relation between cretinism and degenerative changes in the thyroid. This is further strengthened by the fact made known to us by Professor Kocher, of Berne, that after the removal of the thyroid for goitre, a condition gradually supervenes which much resembles adult cretinism, while Professor Horsley, operating on monkeys by removal of their thyroids, has produced symptoms resembling myxœdema which, by virtue of the increase of mucin in the tissues, is the name which has been proposed to be given to the cretinoid condition described by Sir William Gull. It is very noticeable that many of the physical as well as mental and moral characteristics of myxœdema resemble those of sporadic cretinism, and, like it, occur mostly in women. The only exception I have seen was a cab-driver brought by Dr. Fenn, of Richmond, before a meeting of the Thames Valley branch of the British Medical Association. I cannot but feel that the inquiries which are being made with regard to myxœdema will eventually throw light on the etiology of endemic and sporadic cretinism.

There is one subject of great interest at the present time which is made the topic of addresses from presidential chairs

as well as of numerous articles in periodical literature. I mean the higher education of women. The doctrine which has been promulgated of late is, that the higher culture of the faculties of women will make them less capable of becoming "mothers of men." There has been hitherto no objection to their being taught everything relating to art, music, or their emotional life, but directly there are attempts made to cultivate their judgment, to teach them how to reason, to inculcate habits of self-control, we are met by clamors which, in my opinion, are not based on experience, and, so far as the etiology of feeble-mindedness is concerned, are likely to be prejudicial. If there is one thing more certain than another about the production of idiocy it is the danger which arises from the culture of only one side of a woman's nature; so long as only the emotional side of their nature is cultivated and they are responsive to the least unexpected sound, unreasoning as to the world of nature about them, and thrown into emotional paroxysms by the sights and trials which will be sure to cross their path, they will, from my point of view, be liable to become the mothers of idiots. Without advocating overpressure, which is as bad for the neurotic boy as for the neurotic girl, and which is to be avoided during the developmental life of the one as well as during the developmental life of the other, there can be no reason why the faculties which they possess should not be cultivated so as to make them not only fit to be "mothers of men" but also companions and helpers of men. At all events, let the trial be made without prejudice, and let us welcome the advent of a time when women shall not be the mere frivolous toys of the hour but have and enjoy the privileges and rights of which it is absurd to deprive them.

My statistics show that we must look mainly to the health and mental life of the parents. They point to the importance of training our sons to be temperate and our daughters to be self-possessed. They indicate that we should seek alliances for our daughters with men from a healthy stock, that our sons should avoid women whose emotions are developed at the sacrifice of their judgment and self-control. They show that idiocy is often the natural outcome of a gradual process in which the strain becomes more and more degenerate, requiring only an insignificant factor to produce the direst results.

CHAPTER III.

INFANTILE mania is not of frequent occurrence and has not been the subject of much comment. Nevertheless very well-marked examples have come under my notice in quite young children; cases where the various phases of insanity in the adult have been well represented; acute maniacal attacks, in which the patient tears and destroys everything within reach, or creeps under tables and sofas to hide, screaming with undisguised rage and biting and scratching any one who approaches. This attack subsides and the boy behaves as nicely and intelligently as possible, but in a few days has a recurrence with as great violence as before. Some few years since a little boy of this class was sent to me. He was by no means deficient in mental acuteness, in many respects was precocious; he was an only child, and having lived a good deal with adult people he talked rather sagely, but he was liable to attacks of acute mania of a very marked kind. There were no bounds to his petulance and violence. He would attack his father in the street and behave in all respects in an insane manner, regardless of any injury he might inflict, even on those for whom he ordinarily entertained affection. In the intervals of the paroxysms he manifested traits which made him much liked by those about him.

Occasionally I have met with cases having well-marked delusions of suspicion. The ordinary trust and unsuspiciousness of childhood has been replaced by painful mistrust. In one case the child imagined that he was watched and that some one was listening at the key-hole. Another had delusions that things were mixed with his food and had evident fear of being poisoned. I have seen some cases of melancholia associated with manifest delusions, one boy believing that he resembled an animal and frequently looking into the mirror to confirm or dissipate the conviction; another believed that she would break if you touched her, and the fear of falling to pieces like a fragile piece of glass was a real terror to her. I

had some years since under my observation a girl who, when eight years of age, put her baby brother on the fire so that he was dreadfully burnt. The girl herself was ill-favored in appearance and she had been accustomed to hear the beauty of her brother injudiciously praised. In a maniacal attack she attempted to get rid of the subject of so much laudation. About three years subsequently she became epileptic and again later on the subject of epileptic dementia. It is highly probable that the maniacal paroxysm which manifested itself in homicidal mania was really masked epilepsy.

As puberty approaches attacks of mental aberration assume a special character; there is frequently unnatural introspection and a critical hyperconscientiousness becomes prominent. I have recently had five cases under my care, three boys and two girls. They have all had characters much in common, they have all been very good and studious children, but between eleven and thirteen years of age have become moody, have had conscientious scruples as to their motives, have been anxious not only as to whether they have told the truth, but whether when having told it, they have done so in such a way as to convey to others the precise idea in their minds. They have had morbid views as to the standard of right and wrong; sometimes they have detailed things in a non-sequential way. One boy was troubled when he saw a dirty beggar-man or boy lest he should contaminate his mother by thinking of her immediately afterward. I saw him greatly perturbed one day from having seen an errand-boy come to the school-house, and his thoughts flitting to his mother he was rendered inexpressibly miserable lest he had lowered, injured, and contaminated her by unwittingly thinking at the same time of her and the dirty boy. I have sometimes known an avoidance of anything positive in assertion lest the exact truth should not be spoken, so that all the replies are, "Perhaps it was," "It may have been," "I may have done so and so," about things in which no principle was involved, but from a morbid fear of not saying what was true. These cases cause great anxiety at the time and occasionally lead to a permanent breakdown. Many, however, by careful management may be tided over the climacteric period of puberty and then all may go well. It is important, however, to be on guard against any concealed suicidal impulse, and to note its slight-

est indication, as the tendency in such cases is to melancholia and in some instances temptation to self-inflicted injury. Care should also be taken to be quite sure that there is no sexual deviation, and if there be, to treat it, not as moral wrong, which would inevitably lead to further mental disquietude and peril, but as a physical evil which, for the good of the body, it is important should be corrected. These deviations are readily recognized by the aggregation of a group of symptoms which rarely leads one astray. They are, supra-orbital headache, dilated pupils, a brown-umber areola surrounding the eyes, an averted look and a statuesque bearing. This last symptom alone is often very conclusive and may be regarded as certain if associated with the preceding; occasionally the statuesqueness is so marked as to resemble a minor cataleptic state.

Moral insanity is met with in childhood and youth. It has fallen to my lot to have had a great many illustrations brought under my notice—cases of purposeless theft, purposeless lying, and purposeless mischief. They are difficult cases to treat, and make great demands on one's resources. The subjects of this condition are sometimes intellectually bright, and have an amount of address which makes them extremely troublesome to their friends and those who have to guide them. I was consulted some years since about a boy who displayed such destructive energies on toys and every household appliance that he could get into his possession, that his friends thought it indicated a latent mechanical talent, and as he had also manifested mathematical ability he was apprenticed to a firm of engineers. Here his pleasure in creating astonishment led him to introduce sand into the mechanism of the machinery he had to overlook, apparently getting amusement out of the consternation and inquiry which his evil deeds induced. He managed for some time to conceal his delinquency by clever lies; but at length the mischief was fastened on him from his having allowed a traversing machine to go beyond its support in order that he might see the mischief that would ensue. He had good musical talent, and acquiring some skill as an organ player, he would play occasionally in church, and suddenly stop to enjoy the discomfiture his irregularity produced. Eventually he became a thief, and was several times in danger of being brought under the criminal law. All his delinquen-

cies were conceived and carried out with great skill; there was no intellectual lesion, but his moral and affective faculties were thoroughly dormant. He saw no wrong in what he did and he entertained no affection for his parents, who were in a state of perpetual agony. Had he been a member of a lower stratum of society he would have become a jail-bird. Great pains were taken to prevent his getting into the hands of the police, and, the period of puberty passed, he has reached manhood with improved moral sense, and is now getting his living by his musical talent in a respectable and honorable way.

More frequently moral insanity is associated in children and youths with some amount of mental backwardness. The backwardness may be very slight, but yet sufficient to prevent their taking appropriate place in form or in the playground. The manifestations of moral insanity in such case are multiform. I have seen a boy who had brought from school sixteen watches without being discovered by the sufferers or the principal of the school, and this so cleverly done as for a long time to elude detection. Another was dismissed from school because he persisted in getting on the roof and putting pillows and other articles of bedding down the chimneys of neighboring houses in the terrace, or in filling the pillar boxes with stones. Another would beg sufficient money during the morning in the streets to enable him to travel backward and forward by the Underground Railway the whole of the remainder of the day. A still more dangerous form is a tendency sometimes met with of setting fire to articles of furniture, often where it would be perilous to themselves as well as others. Many forms of low cunning are developed in backward boys by associating them with others with more wit, who are also bullies, the feebler one calling to his aid lying, theft, and deceit, to compensate for his lessened intellectual vigor. Again and again I have seen the moral sense developed in boys of this class when they have been removed from the bullying to which they had been subjected and submitted to appropriate training. In all the cases I have met with of moral insanity there has been marked antecedent neurotic history.

This is a convenient place to treat of an interesting class of cases for which the term "idiots savants" has been given, and of which a considerable number have come under my observation. This name has been applied to children who, while

feeble-minded, exhibit special faculties which are capable of being cultivated to a very great extent. One youth was under my care who could build exquisite model ships from drawings, and carve with a great deal of skill, who yet could not understand a sentence —who had to have it dissected for him, and who, when writing to his mother copied *verbatim* a letter from "The Life of Captain Hedley Vicars," by Miss Marsh, although it had not the slightest appropriateness in word or sentiment. Another has been under my care who can draw in crayons with marvellous skill and feeling, in whom nevertheless there was a comparative blank in all the higher faculties of mind.

Extraordinary memory is often met with associated with very great defect of reasoning power. A boy came under my observation who, having once read a book, could evermore remember it. He would recite all the answers in "Magnall's Questions" without an error, giving in detail the numbers in the astronomical division with the greatest accuracy. I discovered, however, that it was simply a process of verbal adhesion. I once gave him Gibbon's "Rise and Fall of the Roman Empire" to read. This he did, and on reading the third page he skipped a line, found out his mistake and retraced his steps; ever after, when reciting from memory the stately periods of Gibbon, he would, on coming to the third page, skip the line and go back and correct the error with as much regularity as if it had been part of the regular text. Later on his memory for recent reading became less tenacious, but his recollection of his earlier readings never failed him. Another boy can tell the tune, words, and number of nearly every hymn in "Hymns Ancient and Modern." Often the memory takes the form of remembering dates and past events. Several children under my observation have had this faculty in an extraordinary degree. One boy never fails to be able to tell the name and address of every confectioner's shop that he has visited in London—and they have been numerous—and can as readily tell the date of every visit. Another can tell the time of arrival of all the children at an institution, and could supply accurate records in relation to it if needed. Another knows the home address of every resident who comes under his observation, and they are by no means few. The faculty of number is usually slightly developed with feeble-

minded children while memory is fairly well developed, and yet I have had under my observation cases where the power of mental arithmetic existed to an astonishing extent. One boy, about twelve years of age, could multiply any three figures by three figures with perfect accuracy, and as quickly as I could write the six figures on paper, and yet, so low mentally was he, that although having been for two and a half years in almost the daily habit of seeing me and talking to me, could not tell my name. Another boy who has recently been under my observation can multiply two figures by two figures, while another can multiply rapidly two figures by two, and a short time since could multiply three figures by three figures, but since an epileptiform attack has lost this faculty to some extent. None of them can explain how they do it, I mean, by what mental process. When by rare chance they have made a mistake, and some hesitation has arisen, it has appeared to me, the plan has been, to clear off the multiplication of the higher figures first. Improvisation is an occasional faculty. I had a boy under my care who could take up a book, pretending to read, an art he had not acquired, and improvise stories of all kinds with a great deal of skill, and in any variety, to suit the supposed tastes of his auditors.

Memory of tune is a very common faculty among the feeble-minded; they readily acquire simple airs, and rarely forget them. I have had one boy under my observation who, if he went to an opera, would carry away a recollection of all the airs, and would hum or sing them correctly. In none of the cases of "idiot savant" have I been able to trace any history of a like faculty in the parents or in the brothers and sisters, nor have I had any opportunity of making an autopsy, except in one instance. This was in the case of a boy who had a very unusual faculty, of which I have never since met another example, viz., the perfect appreciation of past or passing time. He was seventeen years of age, and although not understanding, so far as I could gather, the use of a clock-face, could tell the time to a minute at any part of the day, and in any situation. I tried him on numberless occasions, and he always answered with an amount of precision truly remarkable. Gradually his response became less ready, and he would not or could not reply unless he was a little excited. He had to be shaken like an old watch, and then the time

would be truly given. Gradually his health became enfeebled and the faculty departed. At an autopsy I found that there was no difference in his cerebrum from an ordinary brain, except that he had two well-marked and distinct soft commissures. My explanation of the phenomenon was that as every movement in the house was absolutely punctual he had data from which he could estimate the time by accurate appreciation of its flux. All these cases of "idiots savants" were males; I have never met with a female.

It happens to the congenitally feeble-minded as to the strong-minded to have deviations from their normal standard. There is therefore every form of mental aberration to be met with among them. They become the subjects of acute and chronic mania, of acute and chronic melancholia, and of dementia. It is curious to witness the change which may take place in the mental and moral condition of one deprived to a great extent of intellectual power. Feeble-minded children are not naturally suicidal; they are liable to meet with accidents from their not having any sense of fear, or from not being able to work out the logical sequence of any act, but, under the influence of a melancholic state, they do sometimes become suicidal. Occasionally, under the influence of acute mania, the feeble intellect of the youth becomes fanned into a brighter flame, and he may say things which are quite in advance of his ordinary powers, becoming for the time quick in repartee or pertly rude. The taciturn may become loquacious, the timid and respectful proud and defiant, and the amiable and tractable abusive and destructive. Occasionally, too, a remarkable change takes place in those who are temporarily the subject of the delirium of fever. Three remarkable instances have occurred to me of boys who had never been heard to speak, making use of well-formed sentences during the high febrile state of acute pneumonia in two instances, and of scarlatina in another. In the case of one, who was the subject of pneumonia, the other boys who were in the infirmary at the time were frightened by the febrile ejaculation of their usually speechless companion.

There are two ailments from which, according to my experience, the congenitally feeble-minded are remarkably free, viz., chorea and hysteria. I cannot call to mind, among the large number of cases that have come under my notice, a

single case of acute chorea. I have met with cases of chronic and persistent inco-ordinated movements, but not with the acute cases so common in a general hospital or in a hospital for children. I have assumed that it is partly owing to the lessened emotional life of my patients. The same reason may account for the rare occurrence of hysteria. This defective emotional element in the feeble-minded spares them much grief. Although very affectionate, they will hear of the loss of beloved relations or friends without emotional disturbance and with a remarkable philosophy. They live very much in the present, and are not perturbed by the troubles of the past or the unexperienced future.

Epilepsy is a very common complication of feeble-mindedness. Of the whole number that have come under my observation, 24 per cent have been at some period of their lives epileptic. This appears to be a very large average and indicates to what a great extent the treatment of idiocy is the treatment of epilepsy. Dr. Kerlin, of Pennsylvania, states that "from an examination of the history of 300 imbecile children between the ages of five and sixteen, I find that 66, or 22 per cent, are now epileptics." The percentage is so near my own as to confirm very materially my observations. My cases, however, are not within equally narrow limits as to age, but range from two years to forty. Dr. Kerlin further confirms my observations as to the important neurotic antecedents of feeble-minded children, when he states that 52 per cent have in their antecedents the history of the epileptoid family of diseases. A large number fall under the developmental class and are often associated with a history of eclampsia at first dentition. I have frequently observed attacks come on during second dentition, followed by an interval of freedom until the evolution of puberty. Epilepsy often appears for the first time at puberty and subsequently ceases. Occasionally the status epilepticus supervenes with the worst possible results.

Catalepsy is met with among the feeble-minded, but always in my experience associated with impure habits.

The physical deviations of the feeble-minded are very important. I have already referred to the lessened common sensation and defective co-ordination to which they are prone, to their diminished sense of taste and smell, and to their sight.

Hearing is often obtuse, and is, as I have said, frequently a cause of deferred speech. They are very prone to eczematous eruptions in the flexures of the joints and behind the ears. The skin gives evidence of degeneration in its tendency to unnatural unions; just as the petals of a corolliflоral exogen indicate a lower grade than the distinct petals of a thalamiflоral so do webbing of the fingers and toes and adhesions of the lobules of the ear suggest marked inferiority. Dr. Laycock many years ago called attention to the prevalence of ear abnormalities in people of a degenerate type, and my own observations coincide with his. Lobules absent, lobules adherent, helices defective, and the entire pinnæ misshapen or shrunken, are very common among the congenital feeble-minded. The implantation of the ear is often too far back, giving an exaggerated facial development. I have had under my observation very remarkable examples of webbing, both of toes and fingers, in all cases associated with adherent lobules of the ears. The development of the hair offers some anomalies; some are hirsute over their entire bodies, and 11 per cent have the eyebrows continuous over the nose. I have before referred to the deformations of the mouth and the importance I attach to these in diagnosis. The tongue as a muscular organ is very ill co-ordinated, and this is one factor in the absence or defect of speech which is so characteristic of the feeble-minded. In a number of cases, taken without selection, of an age when speech would be expected, 36 per cent may be regarded as being entirely dumb, and 30 per cent with speech indistinct, while not more than 28 per cent speak fluently; the remaining 6 per cent speak a little and distinctly but with a small vocabulary. With such retarded development it is not astonishing to find that puberty is postponed on an average two years.

Mastication is often defective, partly from carious teeth, and partly from a want of persistent voluntary effort. Deglutition is often hurried, and ill-masticated food is bolted. Rumination occasionally occurs. Three well-marked examples have come under my notice; in one of the cases I found the œsophagus distinctly pouched. They all eructated their food and then placidly remasticated the mass. Excepting when asleep, these were the quietest times of their lives, being ordinarily restless and impatient. The whole process of feeding very closely resembled that of the ruminants.

There is a great tendency to swallow unusual things, such as pebbles and neckties, which generally prove quite inert. Occasionaly, however, the swallowed morsels are not so innocuous, and there are now two or three deaths on record from intestinal obstruction caused by the slow accumulation of hair either bitten from their own head or extracted from mattresses or from swallowing a fibre at a time, picked out of cocoa-nut matting. As might be supposed from the defective innervation which characterizes feeble-minded children they are neither fleet nor persistent in endurance. They are deficient in muscular power as they are also deficient in mental tension. The organs of reproduction are ill developed; among females I have found a great prevalence of small ovaries, and in the males 8 per cent of those who have reached the age of fourteen have either undeveloped or undescended testes. In recording this estimate it is worthy of remark that both accidental, developmental, and congenital feeble-minded youths are included, and I have no doubt that if the investigation had been confined to congenital cases the percentage of defective generative organs would have been much greater.

I have omitted to speak of one very marked characteristic of the nervous system, viz., defective reflex functions. The feeble-minded are very prone to constipation, and it is extremely difficult to produce emesis; they resist any ordinary dose of an emetic nature. On the occasion of several children who had returned from a day's holiday complaining of similar pains in their stomachs, which gave rise to the suspicion that some article of food had been unwholesome, attempts were made to induce vomiting by the administration of twenty grains of sulphate of zinc to each, but in not a single case was it successful, although the fauces were also irritated by a feather. The same thing applies to the absence of cough and expectoration when they are the subjects of phthisis. It is not uncommon for a feeble-minded patient to pass through all the stages of this disease without the slightest cough. Their vaso-motor system, on the other hand, is very sensitive; they are prone to gastric intestinal trouble from sudden change of weather, from bolting their food, from taking too much food at a meal, and from too great predominance of meat as an article of diet, or from the presence of electrical disturbance. Occasionally, but not frequently, feeble-mindedness is asso-

ciated with disseminated sclerosis, with its characteristic gait and scanning speech; more frequently, however, with pseudo-hypertrophic paralysis, two well-marked cases of which I have published in the Pathological Transactions, and several others have been under my observation. In fact, I have seen but few examples of that disease which have not been also characterized by some amount of intellectual lesion. Diseases of the kidneys and liver are extremely rare, on account of the discreet and temperate habits which such patients are accustomed to lead under medical guidance. Rheumatism is very exceptional, probably from the non-exposure to bad weather which the nature of their lives induces. Putting aside the diseases of childhood, diseases of the brain and of the lungs are the chief causes of death. Having regard to the frequency of epilepsy as a complication, it is not surprising that it should be a cause of considerable mortality among the feeble-minded. I find, from the returns of Dr. Fletcher Beach, that about 2½ per cent of the average daily number of inmates of the schools at Darenth die from epilepsy, or more than the mortality of London from all causes whatever.

The prevalence of phthisis as a cause of death among the feeble-minded varies very much with the nature of the soil on which they reside. Through the admirable researches of Dr. G. Buchanan we now know how much associated a damp clay soil is with the existence of phthisis. He has taught us that measures which have been taken in some towns and cities for their drainage in consequence of the prevalence of zymotic disease, have resulted in diminishing the mortality from pulmonary consumption in a remarkable degree.

My own experience lends support, if support were needed, to Dr. Buchanan's view. In the year 1867 I wrote a paper in the "Lancet" "On the Relation of Idiocy to Tuberculosis," in which I showed how prevalent phthisis was among idiots, amounting to 39.8 per cent of the general mortality. My experience since that time has suggested that I ought rather to have headed my paper, "On the Relation of Tuberculosis to a Clay Soil." My observations were made on 1,000 feet of Wealden clay, and I did not know at that time what a relationship existed between the two. My more recent experience on a gravel soil shows the deaths from phthisis to be only 12 per cent of the general mortality. I concluded my paper with

this paragraph: "It is no less clear to me that idiocy of a non-tubercular origin leads to tuberculosis. Whether this arises through the influence of the pneumogastric nerve, malassimilation of food, or defective innervation, it cannot but be regarded that the connection between these maladies is by no means accidental, and that a due appreciation of this relation is necessary to those who would treat effectively congenital mental lesions." I feel it my duty to add to this that the question of soil is an important matter which I then overlooked. When we have regard to the number of days in which out-door exercise is impossible on a clay soil in a climate like that of England, the difficulty of draining it effectively, and the damp exhalations which the clay gives out in warm, and the mist which is condensed in cold weather, we can appreciate the effect it is likely to have on children and youths whose ordinary mortality is greater than that of those with normal nervous power and nutritive energy.

Nothing is more remarkable than the readiness with which feeble-minded children succumb to acute disease of any form, or the way in which they are injuriously affected by climatic changes. The incidence of illness should be narrowly looked for and promptly treated; the thermometer is of great value in indicating the need of early precautionary measures. Before the introduction of the clinical thermometer the principal indication of deviation from health was loss of appetite. I have known a boy in whose case the first suggestion of illness consisted of a face suffused with tears, because, as he said, the boy who had sat next him at tea had eaten three slices of bread and butter and he could not eat any. This was the prelude to one of the most serious ailments to which the feeble-minded are subject, namely, broncho-pneumonia.

My own observation as regards the height and weight of idiots are very much in harmony with those of Dr. Shuttleworth, and Dr. Tarbell, of America. I find that feeble-minded children are shorter and lighter than the normal standard, and agree with Mr. Charles Roberts, "that the relative rate of growth of the two sexes of idiot children follows the same rule as that of normal children, and is subject to the same variations at the age of puberty." "It was found by Dr. Bowditch," so writes Dr. Tarbell, "in his investigation of normal children, that until the age of eleven or twelve years

boys are both taller and heavier than girls of the same age. At this period of life girls begin to grow very rapidly, and for the next two or three years surpass boys of the same age both in height and weight. Boys then acquire and retain a size superior to that of girls, who have now nearly completed their full growth."

The diagnosis of idiocy is of importance, both in order that the child may early be put under proper training and for medico-legal purposes. The profound cases are not difficult to diagnose, especially if associated with microcephalism or with marked asymmetry of cranium. The congenital class is that which has to be considered in early life. There is a marked want of muscular power, as indicated by the inability to support the head and to use the hands for prehension. The eyes look out as if on an objectless world, and the attention is not arrested by the usual expedients to excite recognition in infants. To the most loving endearments there is no responsive smile, and the infantile cooing is replaced by a wailing cry. The instinctive process of feeding is often acquired with difficulty and indicates, what I have long observed, that there is no predominance of instinct in idiocy. On the contrary, so far as instinct itself is concerned, the young animal is on a higher platform than an idiot baby. The latter would not search out the source of the maternal supply nor make successful efforts to regain the nipple if once out of the mouth. Later on there is a marked indisposition to make muscular effort, there is no responsive leap when the feet are allowed to touch the ground, and when taken in the hands the scapular muscles offer no resistance, and the arms helplessly extend themselves over the head. There is no disposition to crawl but rather to lie on the back in an irresolute way. Still later the power of standing is deferred, and walking is an accomplishment which may never be attained.

I have already referred to the physical deviations in congenital idiots, such as the deformed cranium, the vaulted palate, and ill-developed ears, and these come to our aid in a remarkable way in the question of diagnosis. The same may be said of the ethnic characteristics, especially the Mongolian type, which is so significant of congenital mental incapacity. In the developmental class I have already referred to the prow-shaped frontal bone as being highly typical and an aid

to diagnosis, certainly helping us to assign a case to this division where there are psychological grounds for apprehending mental deficiency. With regard to the accidental class, physical deviations do not come to our aid. They have usually none of the grave deviations of conformation which we meet with in the congenital class. They have, as I have said, nothing in their look which would indicate their mental decadence. On the contrary, they in most cases during their childhood present physical features but little indicative of the terrible disaster which has befallen them; except in the paralyzed subclass they are fleet and mobile, and mischievous to a degree. They are irritated by constraint, are intolerant of having their heads examined, and try to escape from one's ken, they pull open every drawer that is unlocked, shake the handle of the room door to procure its opening, and sweep with their hand the ornaments off one's table that they may enjoy the rattle. They alternate their mischievous pranks with shrill and unmeaning cries. They rarely speak, are fond of feeling things with their tongues, and run about to get some fresh object on which to indulge this freak. They too frequently return a proferred kiss by a bite, and fill up the intervals of their mobile mischievousness by blowing bubbles with saliva on their lips. They have this important diagnostic feature, that they live entirely in a world of their own; they do not listen with a childlike curiosity to the conversation which is going on in their presence—a conversation which is all-important to them, and in the outcome of which they are the most interested parties. They hear what is said, but they do not attend, nor can their attention be arrested, except by diverting them into new channels by a more attractive trail. They have usually great intensity of purpose, and succeed in having their own way, the mothers giving up the contest for the sake of peace. Slavering is a very common sign among the members of the three classes, arising sometimes from inattention, or from hyperæmic condition of the salivary glands, from prognathous form of jaw and inadequate size, or want of muscular power of lip, from inco-ordinate movements of the tongue, and sometimes from a combination of two or more of these conditions. Automatic movements are also very common; these may consist of rotatory movements of the head on its axis, of the body from side to side, or from back to front, or rhythmical movements of the fingers before the eyes.

There are a large number of boys and girls who are dull and backward and who develop tardily, but do arrive at last at a fair amount of intellectual power. They are the *enfants arrières* of the French writers. It is very important that their condition should be differentiated from that of idiots. Their state gives rise to much solicitude, and the prognosis depends very much on a right appreciation of their condition, as they respond very much to proper training. The test which I have found most useful is one suggested in the first instance by Dr. Charles West. In any given case we have to ask ourselves, Can we in imagination put back the age two or more years and arrive thus at a time perfectly consistent with the mental condition of our patient? If he be a backward child we shall have no difficulty in saying what period of life would be in harmony with his state. If, however, he be an idiot there is no amount of imaginary antedated age to which the present condition of the child corresponds.

I have already referred to the frequency with which lesions of speech occur among the feeble-minded. They often constitute a basis of great interest and importance for a diagnosis. The absence of speech when a child arrives at five or six years of age is in itself a matter for grave anxiety. It will be usually possible to refer the condition to one of three causes: (1) The child is completely deaf or has some slight congenital defect of hearing; or (2) there is some defect of conformation in the tongue, palate, or lips which prevents language being acquired; or (3) the child is defective in mental power, and either does not require speech from the absence of ideas or has an inability to convert ideas into words. Even when speech does exist it is often echo-like. I have had several children under my observation, in whom this kind of talking is characteristic. To my question, "How are you to-day?" came the immediate reply, "To-day." I ask another, "Are you a good girl?" the response is simply "Girl." Many such cases, however, may be gradually led to intelligent response. Sometimes the whole question is repeated, and the echo is not simply that of the last word. Often the absence of speech is associated with a perfect understanding of what is said, the speech faculty being a later development than the capacity for understanding spoken words. Gesture language frequently takes the place of spoken language in the feeble-minded.

The want of speech is scarcely ever recognized by friends or relations as the outcome of feeble-mindedness. "My child," says almost invariably the mother or father, "has no deficiency except that he does not talk." When the child is being trained the parents regard the acquisition of, or improvement in, speech as the touchstone of progress, disregarding a number of other faculties which have been developed, or evil propensities which have been effaced. In many cases they are right, the absence of speech without deafness or deformity being a very important indication of a grave mental lesion.

A fertile field for the investigation of the morbid anatomy of idiocy is opened up by the inquiries of Hitzig, Jackson, and Ferrier into the localization of function, and by improved microscopy aided by the use of staining agents. A very prominent characteristic is the diminished weight of the encephalon. Sometimes the diminution is very great, as in the microcephalic or Aztec variety. I have had the opportunity of examining several, but the most complete example was the brother of the boy described by Professor Marshall in the Transactions of the Royal Society. The brother in question was for some years under my care, and was an extremely good example of the susceptibility to education of even most unpromising cases. He acquired language, read books with simple words, amused himself with pictures, and much enjoyed life. He was very agile, but always rested himself by placing his hands upon his knees, and when he ran he did so with his head far in advance of his body in a simian-like manner. He had a copious gesture language, which he had adopted before he acquired speech, and when he spoke he opened and shut his eyes and shook his head in a manner very suggestive of one of the quadrumana. He died at the age of eighteen. His mother had only given birth to two children, and they were both, as I have said, microcephalic. There was a history of extreme alcoholic intemperance on the part of the father, who died prematurely therefrom. The boy was fifty-six inches in height and weighed only thirty-nine pounds. He died from phthisis with caseous deposit in his lungs and with more recent disseminated tubercle.

His head measured 15 inches in circumference. Its antero-posterior curve was 8 inches. Its bilateral curve 8 inches. Its antero-posterior diameter 5 inches, and its bilateral diam-

eter 3.9 inches. The encephalon with its membranes weighed 15 ounces. The cerebrum was 4.2 inches long, 3.9 inches wide, and 1.8 inches high. It was attenuated in the occipital region in length, width, and depth.

The departure from the ordinary course of development arose in all probability at an early period in the history of the germ. The convolutions which were best developed were those of the frontal, parietal, and temporal regions, while those less so were the orbital, but especially the occipital region. The central lobe, or island of Reil, was represented only by a slightly elevated prominence. Gratiolet laid great stress on the supra-marginal lobule as characteristic of man; in this brain, however, the whole was reduced to the smallest possible size, while the bent fold was disproportionately large. Certainly the conformation is not explicable by reference merely to retarded growth, and lends, therefore, no countenance to the arguments of those who regard microcephalic brains as due simply to synostosis. In this case the sutures of the cranium remained with remarkable distinctness. The defect was one of development, and not of growth merely. The evidence of this is derived from the modification of the cerebral convolutions and the simplicity of their form. While all the parts of the perfect human cerebrum were represented, they, in a large number of cases, rivalled in simplicity the quadrumanous type. Like the brain described by Professor Marshall, the simplicity of arrangement was not equal throughout the whole of the convolutions, and here again some additional proof was offered of the arrest in development not having taken place at a definite period of embryonic existence.

On comparing this brain with that of his brother, it was noticed that while the parietal region remained the same, the frontal exceeded it in size. How far this was the result of the physical training to which he had been submitted one can only surmise. Certain it is that it is the only part of the brain which was proportionately larger than that of his brother, while the occipital lobe appeared to have undergone but little developmental change. Comparing his convolutions with those of the orang and chimpanzee they appeared to be less complex, the convolutions being smoother and less disturbed by secondary sulci. The absence of a well-defined supra-marginal lobule, the absence of the second connecting con-

volution, the simplicity of the bent convolution, the presence of the calcarine lobule, the absence of the accessory fold which unites the lobule of the second ascending fold to the superior marginal lobule, were all characters which approximated it to the quadrumanous brain. On the other hand, the want of symmetry, the presence of several of the external connecting folds, the absence of an operculum, the position from which the bent fold took its rise in reference to the fissure of Sylvius, the complete absence of the two internal connecting convolutions, and, lastly, the complete junction between the calloso-marginal and the middle temporal or uncinate convolutions were characters essentially human.

Cases of extreme asymmetrically developed brains are not infrequent; a very characteristic example I published in Vol. XX. of the Pathological Transactions, and many similar ones have come under my observation. The most frequent want of development is that of the occipital lobe. Where there is any approach to smallness of the brain this lobe is the part which shows greatest want of development. This condition has been noted in a case reported by Dr. Shuttleworth, in which the frontal and parietal lobes were fairly well developed but the occipital lobe was quite rudimentary. Dr. Fletcher Beach has also published some cases of microcephalism where the defective development of the occipital lobe was very marked.

Hypertrophy of the brain is not infrequently met with. In one very remarkable case that came under my observation there was the coexistence of a huge cranium with all the sutures completely ossified. So thoroughly was this the case that if it had occurred with a microcephalic cranium it would have been a strong argument in favor of the causal influence of premature synostosis in microcephalism. In another case the cranium was remarkably and uniformly thickened, and the brain weighed sixty-two ounces. On removing the dura mater the entire surface of the encephalon presented a blancmange appearance, in great measure obscuring the outline of the convolutions, which had great simplicity. The opacity appeared to be due to the presence of lymph, in the sub-arachnoid space, in the meshes of which lymph, limpid serum was contained. The substance of the brain was very tough and the cineritious portion pale. The subject was only fifteen

years of age, and was remarkably stolid and irresponsive to all external impressions. Dr. Fletcher Beach has published a collection of cases which well illustrate hypertrophic conditions of the brain.

Absence, more or less complete, of the commissures is met with. In 2 per cent of the cases I have examined there has been almost entire absence of the corpus callosum, and in 8 per cent absence of the soft commissure.

Pallor of the gray portion of the encephalon is very frequently met with in the brains of feeble-minded children. Looking back over my post-mortem notes, nothing is more striking than the frequency with which extreme pallor is mentioned. I cannot but think that this affords indications for treatment as well as a basis for hopefulness in the possible functional improvement of the cerebrum.

The treatment of the various phases of feeble-mindedness resolves itself into medical and physical; and training, both moral and intellectual. The importance of commencing this betimes cannot be too much insisted on. Early training is of importance in preventing the growth of bad habits which become engrafted on the child. Constantly one meets with children who grow up a trouble to themselves and to those around them, from the injudicious treatment of some ignorant nurse who tyrannizes over the family by her supposed essential relation to the child. Much time is often required to undo the evil—even if it be capable of being counteracted.

There are two great hindrances to the early and successful training of feeble-minded children arising from misconceptions on the part of many members of the medical profession. It is constantly said to the anxious parents of these children, "Do not be troubled, the child will grow out of it; wait till he reaches seven years," or, if the child has reached that age, then wait till he has reached fourteen. I know nothing of cataclysmal improvements, such as are here indicated. The opinion and advice have no bases in experience. The septennial periods referred to are periods of anxiety and peril; they are not periods of sudden leaps from mental feebleness to mental vigor; they are, on the contrary, developmental crises full of danger, periods when wreck of what mental power exists is liable to take place. How often one has cause to lament the precious time lost by the parents being thus lured

into a fool's paradise! It should be remembered that the increments of intelligence are slow; that every proper habit has to be implanted; that many things which are thought instinctive and appear to come naturally, have, with painstaking solicitude, to be taught. Bad habits of the most serious kind spring up which militate against the progress of the child while waiting for the sudden change which never comes.

The other great mistake in the medical advice which is often given is the insistance to the mother that her child should not mix or be trained with children like himself, but with more intelligent children. Now, flattering as this may be to the parents, it is thoroughly baneful to the interest of the feeble-minded little one. The most successful training is effected with the child's equals; in this way a healthy emulation is established. Intelligent children will not take part in the amusements and games of feeble-minded ones, moreover, there is no community of feeling or of interest. The outcome of an attempt to train the feeble-minded child with others more intelligent than himself is infallibly to make his life solitary and to accentuate the condition which it is of the greatest importance to correct. I have seen the relative of a nobleman, living in all the luxury of a well-appointed country house, so put aside by her sisters, junior as well as senior, that she never ventured on a remark, and at length lost speech. I have seen the same girl transferred to a class of children like herself, pass from monosyllables to thorough conversational language, amid the sympathy and companionship of her compeers. Mothers of feeble-minded children invariably think their children more intelligent than any others of a like category, and they only need the bias of medical opinion to put off proper and effective aid until it is too late. Being afraid of their association with others of the same class, the parents either send them to schools where their lives are made wretched by teasing, and where they fall hopelessly behind, without the benefit of individual skill, or the helpfulness of collective emulation; or the boy is relegated to a country vicarage or Welsh farm, without any of the appliances or agencies which can develop his best possibilities. The first thing to be done is to rescue the feeble one from this solitary life, to give him suitable companionship, to place him in a condition where all the machinery shall move for his benefit, and where he shall be surrounded

by influences of art and nature calculated to make his life joyous, to arouse his observation, and quicken his power of thought. No one who can speak from experience in the matter would hesitate in saying that the companionship of their equals in intellectual power provides just the attrition which is desirable—that the association with their superiors condemns them to a life of isolation which renders nugatory all efforts for their improvement. The fear that the association of a feeble-minded child with feeble-minded children will exercise an injurious effect upon the growth of his intelligence is incorrect and not based upon experience.

Dr. Ireland has very well said that "imbecile children are no more injured by the presence of others of inferior intelligence than ordinary boys and girls are made childish by the appearance of a baby in the house—that it is often, indeed, a great advantage for children to get rid of the uniform and hopeless inferiority in which they have hitherto lived, and to find that they have equals with whom they can interchange their simple ideas, and who give them a ready sympathy, and even to find that they have inferiors." How well I remember one feeble-minded boy coming to me and expressing his interest for another who was crippled, and saying to me, "Doctor, what a pity it is that that boy is lame, although he is not quite right." If there was any effect from the association it was that it begat a pharisaical spirit rather than exercised a depressing influence. The position of the feeble-minded is not always a very desirable one in the houses of the wealthy. Too often his claims are lost sight of, and the great aim is to keep his existence a secret, while no kind of companionship is established between him and the other members of the household. Moreover, the claims of society and the presence of visitors tend to make what little training there is desultory and futile, and lead to his being consigned to the care of servants in the less frequented portions of the house, where his life must necessarily be monotonous, uneventful, and uninteresting. If such are the difficulties among the wealthy, how much more are they intensified in the houses of the poor, where the parents are making a desperate struggle for existence—where the afflicted little one uses up the time and energy of one sane life! How can it be possible, with the arrangements of a cottage, that anything tangible can be done

to rescue the child from a condition which is deplorable in every aspect? Is it not probable that the mother, with her attention always directed to this object of care and anxiety, will propagate a neurotic race? Those who have witnessed the transformation in children who have been removed from squalid cottages to a well-regulated institution, or have seen their joyous return from luxurious homes to their companions and their training, will be able to realize how truthful is a mother's account of her boy that: "When putting him to bed the last night he was here he was smiles all over, saying, 'Going back to school to-morrow, mother,' and he packed his own bag before I could get to him in the morning, and could hardly finish breakfast he was in such a hurry to be off, and went away all smiles and delight."

It must always be kept in mind that the basis of all treatment should be medical. Medical, I mean, in an enlarged sense. Success can only be secured by maintaining the patient in the highest possible health. This is very well indicated by the intellectual torpor which follows or accompanies declension of health, and the lessened intellectual vigor which is met with in cold weather. I have referred to the hibernation which occurs among many feeble-minded children, and which has led me to notice that their intellectual vigor is directly as their external temperature. The pallor of the cineritious portions of their brains, which is so frequently met with, is suggestive of the necessity of vigorously maintaining their nutritive life. A very liberal dietary is of great importance. It should contain a fair quantity of nitrogenous elements, and be rich also in phosphatic and oleaginous constituents. Green vegetables are very essential, as in their absence there is a great tendency to become scorbutic. Care should be taken that farinaceous food, as represented by the so-called corn flours, should give way to the more plastic elements of nutrition found in semolina, entire wheat flour, or macaroni. Not only must the diet be sufficient in amount and good in quality, it should be exhibited in a form suited to their power of mastication. Their bedrooms and sitting-rooms should be spacious and well ventilated, and especially well warmed.

The skin should be kept in healthy function by frequent sponge and other baths, both for the sake of the individual health, and for the health and comfort of their associates.

The exhalation from the skin of feeble-minded children is something *sui generis*. It is of great importance that their residence should be on gravel soil, and with well-made walks, that no opportunity may be lost for out-door exercise. Warm clothing is essential, to prevent as much as possible the disastrous effects of climatic changes. I have before referred to the relative frequency of phthisis to the ordinary mortality. Dr. Fitch, of Elwyn, Pennsylvania, in a very interesting paper, relates his experience that over 50 per cent of his deaths were from disease of the lungs and air-passages. My own experience is that on a clay soil 64 per cent, while on a gravel soil 44 per cent of the mortality was from that cause. He also relates, what is in conformity with my experience, and in harmony with what I have been insisting on, that there is always a remarkable immunity from disease during the summer months. Having placed our patient under the most favorable hygienic conditions, the special training should be carried out with great enthusiasm. Physical training must form an important part of the education. The feeble muscles must be nourished by calling into exercise their functions, as well as by massage and by galvanism. Simple automatic movements, which I have referred to as being so common with the feeble-minded, should be replaced by others which are the product of will. We have to commence with very simple ones, gradually making them more complex. The want of co-ordination in the muscular system is very characteristic of the feeble-minded, and it is only by judicious physical training that the mutiny of the muscles can be overcome, and that purposeless acts can be converted into voluntary efforts suited for the wants of daily life. This training has to be carried out in great detail so that every voluntary muscle and every system of muscles may be called eventually into action. In this way the various acts of prehension, locomotion, and mastication are taught, the tongue becomes a willing agent, and the lips learn to retain the saliva which before gave our patient a repulsive look. I cannot enforce too strongly that little progress is made in speech until we first attain co-ordinated movements in the limbs. Finger lessons are to precede tongue lessons. I always remember the pinioned Frenchman who entreated that his arms might be freed because he wanted to speak. Unless we succeed in unpinioning the arms of our

patients they do not speak. It is to be remembered too that we cannot bring into harmonious relation the muscles and the will without improving the physical quality of the brain and the other nervous centres. By these means, too, we shall have placed our patient in practical relation with the external world and initiated reasoning power.

The moral training is of great importance. While his physical and mental powers are being developed by hygienic and physiological processes, he has to be taught to subordinate his will to that of another. He has to learn obedience; that right-doing brings pleasure, and that wrong-doing is followed by its deprivation. The affective faculties should be so cultivated that the deprivation of the love of the teacher should be the greatest punishment and its manifestation the highest reward. In this way indications of untruthfulness, selfishness, obstinacy, sensuality, theft, and unkindness to companions are checked. Corporal punishment should be strictly forbidden. The tact of the teacher will be called into exercise in devising the suitable reward or punishment. I have seen a girl exhibiting violent obstinacy melted into contrition and obedience by the threat of the teacher that she would wipe from her face the kisses she had given her the previous day. In no case should the punishment interfere with the hygienic treatment. Nothing is worse than the deprivation of food for an offence. I have seen a case of violent and uncontrollable temper reduced to calm obedience by the administration of a basin of bread and milk. The moral delinquency was the result of mental excitement the outcome of defective nutrition.

The intellectual training must be based on a cultivation of the senses. They should be taught the qualities of form and the relation of objects by their sense of touch; to appreciate color, size, shape, and relation by sight; to understand the varieties of sound when addressed to the ear; the qualities of objects by their taste and smell. The lessons should be of the simplest kind at first and gradually cumulative. Nothing is to be left to the imagination. The concrete must be taught, not the abstract. In this way we give them the basis from which their reasoning and reflective powers can be developed. Synchronously with this we make use of the physical powers we have cultivated. They should be taught to dress and undress. They should be trained to acquire habits of order

and neatness, to use deftly the spoon or the knife and fork; to walk with precision and to handle with tact. The defective speech is best overcome by a well-arranged plan of tongue gymnastics, followed by a cultivation of the purely imitative powers, teaching at first monosyllabic sounds which have concrete representatives. The use and value of money where shops are not accessible is best taught by a plan I devised of instituting a shop furnished with the usual appliances of sale. One patient acted as the customer and another as the trader. In this way a purchase was effected and the whole transaction of buying, weighing, calculating, and paying, with the reception of change, was made under the criticism of the assembled class. All these belong to school instruction.

It is desirable, however, to supplement the house and school by gardening and farming operations; by the lathe, the fret-work machine, the carpenter's bench, and, for the more advanced in education, the printer's shop. For girls, kindergarten occupations and the various elegancies of needlework may be the outcome of persevering endeavors, while music and dancing may for all alternate with dramatic entertainments, which are most useful in appealing both to the eye and the ear. Care should be taken that the physical should interchange with the intellectual training. It is of the greatest importance that the teacher should keep clearly in view that his primary object is to make the pupil self-helpful, and, as far as possible, a useful member of the community; in this way more is done than by any other means. Mere *memoriter* knowledge is of little value; everything which makes him practically useful makes him proportionately happy.

But I am warned that my allotted time has expired. Methinks medicine of these later days, which has signalized her march by numerous victories, has had no more beneficent result than has been achieved by the enthusiasm of such men as Howe, Seguin, Wilbur, Knight, and Conolly of the past, and by those still living who are followers, it may be at a reverential distance, in the work of rescuing from oblivion and neglect a class who appeal to our tenderest sympathies and our most affectionate regards.

CHAPTER IV.

ACCOUNT OF A CASE IN WHICH THE CORPUS CALLOSUM AND FORNIX WERE IMPERFECTLY FORMED AND THE SEPTUM LUCIDUM AND COMMISSURA WERE ABSENT.

THE medical literature of examples of defective commissures of the brain comprises so few cases, and of these the life-history is so imperfect, that I need no apology in placing the records of another before the members of the profession. The question has often been proposed to me, what relation idiocy bears to these arrests of development. At an early stage of my inquiry into the pathology of idiocy, I was prepared to meet with many cases characterized by the heading of this paper, but on further investigation found that, with the exception of deficient commissura mollis, absence or defect of the larger commissures of the brain occurred but seldom. Among fifty brains of idiots which I have dissected, the following is the only example of this nature.

That idiocy frequently depends on defective commissural connection my present experience does not support; but, on the other hand, that the absence of such connection may not occasionally be a cause of this calamity is, I apprehend, a question *sub judice*.

Mr. Paget, in the twenty-ninth volume of Med.-Chir. Transactions, has so ably generalized on the cases at that time on record, that there is little to be done beyond adding to the facts illustrating this interesting subject.

The case to which I beg leave to call your attention, is that of A. B., a boy aged nine years at the time of his death. He had previously been under my daily observation for two and a half years. He was the first-born of three children: the second, a boy, is also idiotic; while the third and youngest, a girl, is healthy and intelligent. The respective ages of his father and mother, at the time of his birth, were twenty-six and twenty-seven years; there was no consanguinity between

them. There is no history of mental disease, or of any such defects as club-foot, hare-lip, cleft palate, etc., in either branch of the family. The mother's brother died of phthisis, but it was not thought to be owing in any way to constitutional predisposition. The mother, anteriorly to her marriage, had suffered intense pain in the left side, accompanied by hysteria; subsequently to her marriage, and during the pregnancy which speedily followed, there was no diminution, but rather an increase, of these sufferings. The pregnancy was attended by violent vomiting; and the pain in the side becoming more and more insupportable, opiates were largely resorted to for its relief. About this time Sir Benjamin Brodie was consulted, and his written opinion expresses the belief that she was suffering from renal oxalate-of-lime calculus. There were no unusual circumstances during parturition.

At five years of age the boy was received into the Asylum for Idiots at Earlswood. He was then a fair and delicate child, three feet three inches in height, fifty-three pounds and a half in weight; the shape of his head was oval, the circumference above the eyebrows eighteen inches and five-eighths, length between the eyebrows and occipital protuberance eleven inches and three-quarters, width of forehead four inches and a half. At this time he could stand alone, but was unable to walk; he was fed with a spoon, as he had no notion of masticating, and it was necessary for his nurse to convey the food to the fauces in order to excite the reflex act of deglutition. He could not speak, and was very spiteful. His habits were dirty, and this was augmented by frequent diarrhœa. When seven years old he was able to walk, though feebly, and was placed in the infant class for training and instruction. At nine, the period of his death, he could walk and run, his spiteful habits had been overcome, he was mild and tractable, and exhibited much fondness for his younger brother. He was timid, and afraid of certain toys, did not play with other children, and found most amusement in looking at a picture scrap-book. He was fond of listening to music; had little or no power of imitation. Although great pains were taken to instruct him, he could scarcely be said to have learned anything. He would in some measure go through simple exercises in drilling at command, but could not be taught to throw a ball with any aim. There was no want of co-ordination in his

movements and no diminution of sensation; his habits had become moderately correct: he was able to feed himself with a spoon, the meat having been previously minced, and with some difficulty he was taught to raise a cup to his mouth. He recognized his father and mother; on seeing any lady in black, the color usually worn by his mother, he would approach, and after examination would say, "No, mamma! [illegible] me" when he wanted anything, was [illegible] his powers of utterance. He had no [illegible] his disposition was remarkable.

His health was far from good; he was never long [illegible] purulent ophthalmia, eruptions at the nasal [illegible] mucous abscesses, or diarrhœa; but he had [illegible] convulsions or epileptic fits. He died [illegible] the right side.

[illegible] examination was made thirty-three hours [illegible] The right lung was hepatized throughout, except [illegible] Several of Peyer's glands in the ileum [illegible] The large intestine extremely [illegible] The testes had descended into the [illegible] The pubes was sparsely covered with [illegible] were healthy.

[illegible] was of normal thickness, but somewhat [illegible] There were granular patches in the arachnoid [illegible] the longitudinal fissure, and between these [illegible] slight adhesions. The encephalon weighed [illegible] ounces avoirdupois: the cavity of the arachnoid [illegible] two ounces of straw-colored serum; the [illegible] normal. The antero-posterior diameter [illegible] was six and a half, its width five and a [illegible] each hemisphere measured across [illegible] the remnant of the corpus callosum [illegible] inches. The antero-posterior diameter [illegible] the cerebellum was two and a quarter, [illegible] and a half inches.

[illegible] the cerebrum and cerebellum, there [illegible] presenting the size, form, arrangement, [illegible] On the first removal of the encephalon [illegible] it was noticed that, on being [illegible] position, the hemispheres separated to an [illegible] bridging into view the great commis-

sure of the brain, but displaying, instead, the velum interpositum. Anterior to the velum, and on the same plane, was exposed, on forcibly separating the hemispheres, a narrow band of medullary structure. A horizontal section of both hemispheres, so as to display the interior of the lateral ventricles, was then made, and the velum interpositum removed. The brain was in no part of its structure deficient in cohesion; the posterior cornu of each of the lateral ventricles was enlarged, and contained about half an ounce of straw-colored serum each. The small hippocampus on each side was rather large; the tænia semicircularis very fully developed. At this stage of the dissection no remnant of the fornix could be discerned; there was positive absence of any septum lucidum. The third ventricle was exposed, but no middle commissure could be discovered; the pineal gland occupied its usual position between the lobes of the corpora quadrigemina, all which structures were of normal size and appearance. At the anterior boundary of the third ventricle there was the before-mentioned medullary band, which was regarded as the representative of the corpus callosum, but occupying a much lower plane than the normal position of the commissure. It presented, both anteriorly and posteriorly, crescentic, thinned margins, and measured at its narrowest part, which was slightly to the left of the mesial line, one-third of an inch. A section was then made through both hemispheres on a level with the transverse band. The optic thalami were unusually flattened, and their inner surfaces indicated that the soft commissure had never been present. There was a marked absence of the peduncles of the pineal gland. The third ventricle presented on its floor the usual structures, and at its anterior part could now be seen the anterior pillars of the fornix ascending at slight angles, but widely separated throughout. Beneath the posterior margin of the transverse band they made a sudden bend, and, passing outward and backward over the upper surface of the optic thalami, terminated in the descending cornua of the lateral ventricles as the tæniæ hippocampi, the tæniæ, however, being narrower than usual. The optic commissure at the floor of the third ventricle was strongly marked, and the lamina cinerea interleaved between it and the anterior commissure, where it terminated. The anterior commissure was well defined, and above it an interval of two lines occurred

between it and the transverse band. The inner surfaces of the anterior lobes of the cerebrum were separated inferiorly as far as the anterior commissure; and the parts of them into which the knee and reflected portion or rostrum of the corpus callosum are usually inserted were covered with convolutions such as are common to other parts of the cerebral surface. The band or rudiment of corpus callosum was situated opposite the widest portion of the corpora striata; its anterior edge being two and one-twelfth inches from the anterior margin of the cerebral hemispheres, and its posterior border being four and one-twelfth inches from the posterior margin of the hemispheres. It did not exceed one-sixteenth of an inch in thickness at any part of it, and its fibres spread out anteriorly and posteriorly on reaching the hemispheres. It will follow from this description that there was no representative of the genu or of the reflexed portion of the corpus callosum; that the body of the fornix, septum lucidum, and its fifth ventricle, and the soft or middle commissure, were entirely absent; and that there existed no communication between the lateral representatives of the fornix; moreover, that these had no connection with the posterior diverging fibres of the transverse band, and consequently that not even the analogue of a septum lucidum was present.

Mr. Paget, in the twenty-ninth volume of Med.-Chir. Transactions, has grouped together with his own case others related by Reil, Mr. Solly, and Mr. Chatto, and has made some important physiological deductions. The case related by him was "not remarkable for any excellence or great defect of mind." In Mr. Solly's, the boy, although "boobyfied," could read, and selected as his favorite reading religious books. Reil's case, a woman, was of dull intellect, but could go errands in the village. Mr. Chatto's patient lived only twelve months.

In comparing the case which has been here detailed with those referred to by Mr. Paget, it would, at first sight, appear to stand opposed to the conclusions at which he arrived, and to support the view that the corpus callosum is necessary to the possession of the average power of the human mind. But this opposition may be only apparent; for it is a circumstance worthy of special regard in instituting a comparison, that while in the three above-named examples the soft commissure

was present, in the one which I have brought forward it was entirely absent. Moreover, in Mr. Solly's case, the soft commissure was "wide and thick," and in Mr. Paget's it was inordinately large, measuring six-tenths of an inch from before backward, and being also thicker than usual.

How far the presence of extra large, middle commissures compensated for other deficiencies in the former cases, and how far its absence was the cause of the extreme mental deficiency in the present instance, I shall not now discuss. I will only say that my researches hitherto lead me to attach a physiological importance to the soft commissure which previous observers have not recorded.

CHAPTER V.

ON THE CONDITION OF THE MOUTH IN IDIOCY.

The opinion which has been formed, both in and out of the profession, in reference to idiocy, has arisen more from the representations of poets and romance-writers than from the deductions of rigid observation. The popular novelist, in this as in other cases, seizes on the characteristics of some exaggerated specimen, portrays them by the aid of a vivid imagination, and henceforth the exaggeration becomes the type of a species in the minds of men. The term idiot has thus become synonymous with the most degraded condition of humanity only—with a creature incapable of being influenced by moral or physical treatment, and separated by an immense gulf from the remainder of mankind. It has arisen, in no small degree, from the existence of this opinion, that until within a comparatively recent period, so few efforts have been made to ameliorate the condition of idiots. In too many cases they have been neglected or allowed to be influenced for evil, regardless of the fact that they might be equally impressed for good. Independently of the benefit that can be effected for these unfortunate sufferers, the benevolent efforts on their behalf have furnished an opportunity for an investigation into their physical and psychical life before unattainable.

The condition of the idiot is not simply one of mental alienation. It frequently presents also grave physical deterioration; and this physical alteration is as much a test of idiocy as is the low condition of mental power. In a community such as that of the Earlswood Asylum, there is to be found every variety of imbecile mind. In fact, just as in the outer world there is a graduated series from the most commonplace intellects -who are "the hewers of wood and drawers of water" up to the giant minds that leave their impress on the age in which they live: so is there among an imbecile population a gradual shading in an inverse direction—from the

youth who might, if he had property, become the subject of inquiry before a master in lunacy, to one who, with every means of communication with the external world, except feeling, closed, vegetates in impenetrable mist. In such a community one can perceive the grades of physical condition accompanying the mental phases; and a study of the physical anomalies becomes as interesting and important as that of the psychological state. When contemplating so large a number as that which Earlswood shelters, one is able to set some of the members aside into natural groups, by simple reference to their physical state, and to predicate from that state what will be their probable future mental improvement.

There is scarcely an organ in the body but may be found gravely altered in idiots: the circulation and respiration are abnormal; the skin exhibits perturbed functions; defective innervation, lesions of motility and nutrition, are abundantly met with; the bodily conformation is often of an aberrant kind. Regard therefore should be paid, in all cases of diagnosis of idiocy, to the physical condition as confirmatory of any opinion based on purely psychological data. It is in this way one is enabled to differentiate an idiot from a simply backward or ill-regulated child.

It is from the conviction of the importance of a study of the physiological manifestations of idiocy, that I have been induced to devote no small portion of time to an investigation into the structure and functions of the various organs *seriatim* among idiots and imbeciles. I purpose in the present paper giving some of the results of my observations of the feeble-minded, in reference to the condition and conformation of their mouths. Characteristic as is this region of various transitory mental phases among the sane, does it bear the permanent impress of a state in which the mind has failed in attaining its normal condition? If so, what is the nature of the impress? Does any value attach to the conformation of the mouth as confirmatory or otherwise of a state of mental incapacity? These are some of the questions we have to solve.

I may premise that these observations have been made during the past year, without reference to any recent legal inquiry, and extend over 200 cases, which have been taken, without any special selection, from a larger number. Not one on the list would in his present condition be able to manage

his own affairs, or be legally held to be responsible. Many of them, however, are susceptible of considerable culture, are affected by the amenities of life, write letters to their friends, make small purchases, and form friendships. Several perform mechanical work with system and order. One, although possessing very little judgment, has been taught French and Latin, and reads these languages as well as ordinary schoolboys. Some few possess extraordinary memories and special aptitudes. 146 were males, and 54 females. Their ages ranged from seven to thirty-six, and the following table gives the numbers at each age last birthday:

No.	Age.	No.	Age.	No.	Age.
2	at 7	14	at 16	5	at 25
4	" 8	18	" 17	1	" 26
2	" 9	10	" 18	3	" 27
4	" 10	14	" 19	2	" 28
20	" 11	18	" 20	1	" 29
23	" 12	7	" 21	3	" 30
11	" 13	12	" 22	2	" 33
12	" 14	9	" 23	1	" 34
17	" 15	3	" 24	2	" 36

They ranged in decennial periods—below 10 years, 8; from 10 to 19 inclusive, 123; from 20 to 29, 61; from 30 to 39, 8.

Palate.—Among the 200 cases included in this inquiry, 82 possessed palates inordinately arched, and with this increased arching were noticed various abnormalities. In some the palate was unsymmetrical, the two sides having different degrees of concavity, or one side plane, and the other concave. In 4 the palates were excessively arched, approximating to the appearance of the roof of a house, and, with this extreme angularity, was great narrowness. Excessive arching of the palate occurred, therefore, in 58 per cent. Excessive flattening of the palate was observed in 4 cases. In 34 cases, or 17 per cent, the palate had a very prominent antero-posterior ridge or keel, corresponding to the line of approximation of the palatal bones. In 7 the palate bones did not meet, leaving a chasm between them, the mucous membrane being, however, continuous. There was no instance of the ordinary cleft palate, and I may remark that in an examination of nearly one thousand I have failed in meeting with an example of that

deformity. In several the hard palate extended but a short distance posteriorly, from defect of the palatal process of the superior maxillary bone and entire absence of the palatal process of the palate bone, and in all these cases the velum palati was unusually flaccid. In the majority of cases there was a marked narrowness of the palate. The following table represents the measurements in 24ths of an inch of the space between the posterior bicuspid teeth of opposite sides:

No.	Distance. In.	No.	Distance. In.	No.	Distance. In.
2	at $\frac{16}{24}$	11	at $\frac{23}{24}$	13	at $1\frac{5}{24}$
1	" $\frac{18}{24}$	24	" 1	9	" $1\frac{6}{24}$
3	" $\frac{19}{24}$	37	" $1\frac{1}{24}$	1	" $1\frac{7}{24}$
2	" $\frac{20}{24}$	25	" $1\frac{2}{24}$	5	" $1\frac{8}{24}$
13	" $\frac{21}{24}$	23	" $1\frac{3}{24}$	3	" $1\frac{12}{24}$
10	" $\frac{22}{24}$	17	" $1\frac{4}{24}$	1	" $1\frac{22}{24}$

It will be observed that 33 per cent do not exceed 1 inch, and that 62 per cent, while being more than 1 inch, do not exceed 1¼ inches; whereas the normal average has been stated to be 1½ inches. It is worthy of notice that these numbers hold no direct relation to the age or stature of the patients examined. Thus, in a youth 22 years of age and six feet one inch in height, so narrow is the palate that there is only $1\frac{3}{24}$ inch between the bicuspids, and only $\frac{10}{24}$ inch between the opposite gums at their widest interval. The lowest measurements occurred in a boy and girl, the boy 12 and the girl 13 years of age. Neither is there a direct relation between the width of the palate and the cranial capacity; for in a microcephal, whose palate was $\frac{22}{24}$ inch wide, the internal canthi of the eyes were $\frac{23}{24}$ inch distant from one another; while in a macrocephal whose palate was $\frac{23}{24}$ inch wide, the distance between the internal canthi amounted to 2 inches.

Teeth.—The principal characteristics of the teeth in idiots are, that the period of the first dentition is delayed, the second dentition considerably postponed, and that they undergo very general and rapid decay. In many cases the anterior surface of the incisors presents a honey-combed appearance, but in no one instance have I observed those special characters which have been well shown by Mr. Hutchinson to be significant of congenital syphilis. In a large number of cases they are de-

veloped irregularly, are crowded, and the canine occupy a different plane from the other teeth—all these irregularities resulting from the imperfect development of the superior maxillary bone. In 6 cases, or 3 per cent, the upper incisors projected to such an extreme degree as to produce grave deformity. In 7 cases the teeth of the lower jaw were in advance of those of the upper.

Tongue.—The most prevailing character noticeable in the tongue of idiots is the hypertrophy of the fungiform papillæ. Undue prominence of the papillæ was observed in 101 instances. In several there is a marked want of co-ordination in the movements of the tongue, so that the patient, although endeavoring to comply with the request, is unable to protrude it. This condition is usually associated with an absence of general co-ordinated movements, and in the improvement which is effected by treatment it is usually the most persistent derangement of motility. In 16 cases the tongue presented a soddened appearance and exhibited deep transverse furrows on its dorsal surface; in all these patients one is able to trace a marked physiological and psychological agreement, and so much do they resemble one another in these respects that they might readily be taken for members of the same family. Inordinate size occurred in 12 instances, and in almost every case was associated with defective power of articulation. In 2 the tongue was unusually long; 33 were mute; 16 semi-mute. In 83 the speech was indistinct. In 62 the speech was fair. Stammering was observed in 4.

Tonsils.—One cause of the peculiar speech prevailing among idiots is the condition of the tonsils. These observations for the most part were made in the summer, when the tonsils were not likely to be rendered worse than their usual condition by climatic influences. In 30 instances they were injected, in 17 slightly enlarged, in 79 considerably enlarged, and in 5 so much increased in size as to interfere with deglutition and respiration.

Mucous Membrane, etc.—Besides the injection of the mucous membrane of the tonsils which has been noticed, other regions of the oral cavity are liable to this condition. The velum palati, uvula, and pillars of the pharynx were found to be thus characterized in 27 instances. The posterior wall of the pharynx was observed to be marked by considerable

vascular injection in 33 cases, and in 6 the mucous membrane had assumed a granular appearance. The buccal and labial glands were generally hypertrophied, and the salivary glands were frequently enlarged. In 11 instances the sub-lingual gland was greatly enlarged. The uvula was elongated in 14 cases, bifid in 2, very short in 1, and entirely absent in 1. The lips were hypertrophied in 2. Owing probably to the abundant supply of fresh vegetables with which the patients are provided, I only found one case in which the gums were swollen and tumid.

Slavering.—The flow of saliva from the mouth is universally associated in the popular mind with the condition of idiocy. The slavering may vary in degree. It may occur only at periods of excitement, and at meal-times, or with scarcely any intermission throughout the day, producing in severe cases excoriation of the chin. Among 325 cases which I have examined, I find 72, or 22 per cent, in which this habit was noticed. Of these, 28 slaver to a slight extent, 17 rather more so, and 26 in an aggravated degree. This peculiarity depends, I believe, on two or three causes—1st, the increased secretion of saliva; 2d, the deformed condition of the mouth; 3d, the want of co-ordinated movements in the muscles of the tongue; and, 4th, the absence of tonicity in the labial muscles. Seeing that slavering exists in 22 per cent of imbeciles, the question may arise—Is it confined to this section of the community? I am not prepared to say that it is never associated with mental vigor; but I believe that, excluding childhood, old age, disease of the mouth and neural lesions, slavering is very rarely unconnected with mental imbecility. Moreover, I have examined with reference to this question 1,000 persons, who are doing the every-day work of the world, without meeting with a single example.

Summary.—We have thus seen that idiocy is not simply a cerebral lesion; that it carries with it marked physical deviations, of which I have shown conspicuous examples in the mouth; narrowed, arched, and unsymmetrical palates; tardily-developed, irregular, and rapidly-decaying teeth; a hyperæmic condition of the mucous membrane and glands; elongated uvulas and hypertrophied tonsils; large, enervated, and rugous tongues, deficient in co-ordinated movements and in their special function; saliva secreted inordinately, and re-

tained incontinently. Such are some of the characteristics of a class, in which mental vigor is in abeyance, which should be taken in connection with the psychological state in diagnosis, and inculcate the doctrine that the psychical condition of these unfortunates should be specially sought to be ameliorated by an improvement of their physical condition.

CHAPTER VI.

ON POLYSARCIA AND ITS TREATMENT.

THE term polysarcia has been so long accepted as a designation of that condition of the body, in which the purely adipose constituents are developed in excess, that I am induced to employ it, although its literal significance is not strictly in accordance with the pathological state.

The history of medicine contains numerous instances of extraordinary obesity, and an immortality attaches to some names, solely on account of special aptitude for the development of fat. It is not in reference to such exceptional examples as some of the earlier records of medicine unfold, that the practitioner is likely to be consulted, but the cases are not infrequent in which his aid may be solicited in mitigating the inconveniences which excessive adipose development entails.

The sufferers from this disease are found more frequently among those on whom fortune has smiled, whose incentives to physical exertion are in abeyance, while the inducements of the table are in excess. Nevertheless among the out-patients of the hospital, I have noticed several cases, in which polysarcia has been the cause of a variety of subjective symptoms which have made life wretched. The subjects have been for the most part women who had passed the climacteric period. They have resorted to the mental solace which alcoholic potations could afford, and their diet, though poor, has been of the kind calculated to induce this state.

Dr. Flemyng, in a paper read before the Royal Society in 1757, regarded corpulency as caused either by the introduction of too much oil in the food, or by the over-largeness of the cells, in which it is deposited—or by a crasis of the blood allowing the oily particles to be strained off too easily—or, lastly, by a deficient evacuation of oil already taken in and separated from the blood.

His remedies were addressed either to increasing the evacuation by the bowels, the sweat-glands, or the renal

organs. Diuresis was his principal hope, inasmuch, he said, as "the animal oil is carried out of the body in the urine." The diuretic he selected was soap, from his supposing it to have the property of "besides increasing the quantity of urine, at the same time rendering the animal oil more mixible with the watery vehicle of the blood."

Darwin, in his "Zoonomia," recommends aerated alkaline water, from an idea of its rendering fat more fluid. Dr. Cullen was of opinion that "the diet must be sparing, or rather, what is more admissible, it must be such as affords little nutritious matter; it must, therefore," he said, "be chiefly or almost only of vegetable matter, and, at the very utmost, milk."

Dr. Brown argues "that as animal food is the principal noxious power, the quantity should be reduced, and more exercise taken."

Dr. Fothergill states that "a strict vegetable diet produces exuberant fat more certainly than any other means I know." He enjoins, moreover, "an abstinence from animal food, so far as the patient's health, situation, and manner of life, will admit of it." Dr. Bright has advised iodide of potassium with the view of giving tone to the absorbents. Alkalies, from their power of saponifying fats, and thus rendering them more miscible, have had their advocates.

More recently, Dr. Duchesne-Duparc has spoken highly of the effect of the extract of the Fucus vesiculosus, stating that it increases the appetite, diuresis, and emaciation.

The following case of polysarcia, which has been for some time under my observation, has given me an opportunity of testing the value of some of these remedies which have been recommended, and of proving the superior efficacy of that which I believe to be the true physiological mode of treatment.

E. C., a girl of healthy parentage, and born in the county of Norfolk, became an inmate of the Asylum for Idiots at Earlswood, in the year 1850, at the age of thirteen years. From notes taken by Dr. Foreman at the time of her admission, I learn that she was congenitally of feeble mind, was four feet four inches in height, and weighed in her clothes 113 pounds; her size at that time attracted observation, as it is noted, "she is enormously stout, cellular tissue everywhere more than usual." Her diet was not much restricted, and

she always appears to have been voracious in appetite. In January, 1857, Dr. Maxwell added to the above notes that she was still the same height, but weighed 151 pounds, and up to that time had not menstruated. She came under my treatment in November, 1858, when I found her indulging in a large mixed diet, with excess of vegetables, and taking very little exercise, and her size was steadily increasing. Her height was still the same, and her weight 196 pounds. Her unwieldy size rendered exercise difficult. From inquiries made of her friends, I found there had been no such instance of obesity among the relatives of her progenitors—that she had been delicate and thin up to seven years of age.

Her diet was restricted to the following scale, which was accurately weighed for each meal: Breakfast—six ounces of bread; one-third ounce of butter; half-pint of milk-and-water. Dinner—four ounces of meat (weighed, when cooked, and free from bone); eight ounces of potatoes; two ounces of green vegetables; six ounces of pudding; half-pint of water. Supper —six ounces of bread; one-third ounce of butter; half-pint of milk-and-water. (The milk-and-water was a mixture of one-third new milk and two-thirds water.) Walking exercise was enforced, and she was required to turn the handle of a large mincing-machine one hour a day.

My note-book states that in January, 1862, she remained the same height (four feet four inches), but had increased in weight. She was then 210 pounds when weighed in her night-dress, and measured, round her waist, fifty-five inches. Her feet and hands remained small, and contrasted remarkably with the appendages they terminated. She had no hair in the axillæ, and scarcely any on the pubis. Although twenty-five years of age she had never menstruated, nor did she exhibit the slightest sexual instinct. She was now able to walk slowly, but with difficulty, and when she fell, was unable without assistance to regain the vertical position. She suffered from dyspnœa, and her breathing at night was attended by so much noise that the occupants of the same room were much disturbed thereby. Moreover, the difficulty she had in moving from her bed had induced dirty habits, which added much to the wretchedness of her life. It was now difficult to induce her to take any exercise, and she was scarcely seated in a chair for a minute without falling asleep. Although imbecile

CHAPTER V.

ON THE CONDITION OF THE MOUTH IN

THE opinion which has been formed, both in profession, in reference to idiocy, has arisen representations of poets and romance-writers deductions of rigid observation. The popular as in other cases, seizes on the characteristi gerated specimen, portrays them by the ai ination, and henceforth the exaggeration l a species in the minds of men. The term id synonymous with the most degraded co only—with a creature incapable of bein or physical treatment, and separated from the remainder of mankind. It degree, from the existence of this op a comparatively recent period, so few to ameliorate the condition of idiots. have been neglected or allowed to gardless of the fact that they might good. Independently of the benefi these unfortunate sufferers, the be behalf have furnished an opportunity their physical and psychical life bef

The condition of the idiot is n alienation. It frequently presents terioration; and this physical altera idiocy as is the low condition of men nity such as that of the Earlswood Asy every variety of imbecile mind. In fa world there is a graduated series from t intellects—who are "the hewers of w water"—up to the giant minds that leave age in which they live; so is there among a tion a gradual shading in an inverse direct

quart of beef-tea a day, made from one pound of beef. She then returned to her meat diet, which was continued without intermission until August 29th, when she weighed 175 pounds. The effect of this diet was to improve her general health and physical power. She was enabled to run, and she took walks with pleasure. The dyspnœa had disappeared, and her clothes had to be altered to suit her diminished form. Her loss of weight had been at the rate of one pound and three-quarters per week.

Wishing to ascertain whether the fucus vesiculosus would influence the system when a purely animal diet was used, half a drachm of the extract was now given three times a day, while the diet was restricted to sixteen ounces of meat. This was continued until November 14th, when she was attacked by scarlet fever; her weight had receded to 153 pounds, the diminution having been at the rate of one pound thirteen ounces one-third per week, or one ounce one-third per week more than when the meat was given without the fucus. During the attack of scarlet fever and the subsequent convalescence, the diet was beef-tea with bread; and on this diet, at the end of four weeks, her weight remained without alteration. On December 12th she returned to meat diet, substituting, however, fifteen ounces for sixteen ounces per diem. This has been continued to the present time (January 15th, 1864); her weight is now 147 pounds, and the measurement round the waist has diminished from fifty-five inches to thirty-seven inches. Her general health is good, and the restricted diet has not been attended by any inconvenience. The following tables will give, in a condensed form, the results:

	Weekly Increase in weight.	Weekly Decrease in weight.
Mixed diet, unrestricted in amount,	7¾ oz.	
Mixed diet, restricted in amount,	1⅛ oz.	
Mixed, restricted diet and iodide of potassium,	nil	nil.
Mixed, restricted diet, and liquor potassæ,	—	2¼ oz.
Mixed, restricted diet, and Fucus vesiculosus,	—	4⅛ oz.
Purely meat diet, without medicine,	—	28 oz.
Purely meat diet, with Fucus vesiculosus,	—	29⅛ oz.

Date.	Age.	Weight.
February 28th, 1850,	13	113 pounds.
January, 1857,	20	151 "
November, 1858,	21½	196 "
January, 1862,	25	210 "
February 13th, 1863,	26	206 "
April 30th, 1863,	—	203 "
August 22d, 1863,	26½	175 "
November 14th, 1863,	—	153 "
January 15th, 1864,	27	147 "

It is only by returning to the views and opinions of medical authorities a century ago that we can duly appreciate the vast service chemistry has rendered physiology, and, indirectly, practical medicine. The influence of respiration in removing carbonaceous materials from the blood, and the possibility of the production of fat from farinaceous and saccharine bodies, are so familiar to us that we wonder at the absence of knowledge on these subjects displayed by the older writers. They all insist on a non-nutritious diet for the cure of obesity, meaning thereby an expurgation of meat and an indulgence in milk and farina. A great mistake was also made in supposing that the urine was the outlet for fatty matters, while they ignored the outlet by the lungs.

On a review of the foregoing case, it is worthy of notice that the young woman has never menstruated, and this, together with the absence of sexual instinct, suggests the idea that the ovaries are undeveloped, and that she may be in the condition of a pig which has been spayed for the purpose of fattening. Her voracious appetite, and a diet in which farinaceous matters largely entered, were doubtless factors in the production of the result. When the diet, however, was restricted to the amount on which her companions were only fairly nourished, still she made fat in excess, to the amount of one ounce and two-fifths per week.

The exhibition of iodide of potassium failed to be of value, other than preventing a continuation of the morbid increase, while liquor potassæ, by interfering with digestion and undermining her general health, produced slight positive diminution. The results obtained from the Fucus vesiculosus were such as to justify its being regarded as a safe and, to a certain extent,

effectual plan for diminishing obesity. It falls, however, far behind what it is possible to effect by a purely animal diet, and while to many the latter remedy may appear as bad as the disease, it should be remembered that a diet so purely animal need not be insisted upon, a compromise may be made, keeping in view the typical diet which should be approached as nearly as possible in the treatment of these cases.

It has been shown by Ranke that even when large quantities of meat are taken, a decrease in the weight of the body takes place, but that the quantity of meat theoretically requisite to maintain the system produces dyspepsia. In the treatment of polysarcia, this difficulty is avoided, the quantity of meat is regulated to supply the want induced by the tissue-changes of the body, trusting to the superabundant fatty matters of the system to supply the demand of the respiratory process. In the case I have detailed, the patient has continued the meat diet for nine months without any dyspepsia, with improved tone, with a power of resisting such a disease as scarlet fever, making a speedy convalescence therefrom, and with the positive advantages of diminished size and increased enjoyment of life.

April 7th.—The patient has continued on a diet of 15 ounces of meat daily, and her present weight is 133 pounds, indicating a continued diminution at the rate of one pound two ounces and a half a week. Her total loss in weight has been 77 pounds; her decrease during the last year, 70 pounds.

CHAPTER VII.

AN ACCOUNT OF A SECOND CASE IN WHICH THE CORPUS CALLOSUM WAS DEFECTIVE.

In the forty-fourth volume of the Transactions of the Med.-Chir. Society I furnished the details of a case in which there was a marked defect in the great commissural connections of the brain, associated with grave defect of the intellectual faculties. I, at the same time, compared the case under review with all others of a similar nature which I could find recorded.

Another instance having come under my notice which illustrates, in a characteristic way, this rare abnormality, I am desirous of placing it on record in the Transactions of the same society, which already contains descriptions of the best-marked examples.

A. B. came under my observation in the autumn of 1858. He was the son of a clergyman, and had been submitted to the ordinary process of education with but trifling results. He had been taught to write a little, but he never exercised the art. He had learned to read easy words, and could answer simple questions. His power of calculation was almost nil. He was fond of music, had slight power of imitation, and his memory, although defective, was good in relation to persons and things. He was five feet four and three-quarter inches in height, and weighed ten stone one pound. His trunk was well formed, and his facial expression that of an imbecile. He was shy, undemonstrative, fond of children (some of whom he petted), while toward persons of his own age and to the opposite sex he was violent and passionate. His friends were very desirous of asserting the non-congenital nature of the mental condition, and attributed it to masturbation. The diagnosis formed, however, was that it was congenital, and that the masturbation was an accidental circumstance. This diagnosis was strengthened by reference to the other members

of the family, who, although occupying good positions in the world were manifestly not of average intellectual power. The habit of masturbation became entirely broken, and he gave himself up to simple employments, such as wheeling invalids in a Bath chair, and otherwise aiding those whom he petted.

He lived to forty years of age, when he died from pleuro-pneumonia. An autopsy was made thirty hours after death. The circumference of the head was 21¼ inches; the bilateral curve 11½ inches; the antero-posterior curve 12 inches; the bilateral diameter $5\frac{8}{10}$ inches; the antero-posterior diameter $6\frac{1}{10}$ inches. The calvarium was unsymmetrical and dense, shelving anteriorly; the posterior clinoid processes were converted into sharp needle-like points; the encephalon weighed 2 pounds 14 ounces. On separating the two hemispheres the almost entire absence of the corpus callosum was apparent, and the velum interpositum exposed to view. A small cartilaginous-like band, $\frac{1}{24}$ inch in breadth and $\frac{1}{24}$ inch in thickness, situated opposite the corpora striata, was the only representative of the great commissure. The fornix was represented by two thin posterior pillars; the body of the fornix and its anterior pillars were absent. The right optic thalamus was very much larger than the left. The cineritious portion of the brain was pale, the posterior cornua of the lateral ventricles were distended with straw-colored serum, and the pineal gland was the size of a wild cherry. The middle commissure was absent. The rarity of this abnormality may be indicated by the circumstance that it is only the second time I have met with it in the dissection of 150 brains of idiots.

CHAPTER VIII.

MARRIAGES OF CONSANGUINITY IN RELATION TO DEGENERATION OF RACE.

PROBABLY no subject which has engaged the attention of the medical statist has given rise to more widely divergent views, certainly no inquiry on the part of the physiologist, has been productive of less practical results, than the one which heads this paper. There is a class, and probably a large one, which looks upon consanguineous unions as universally productive of evil, and where the worst consequences are not met with, regard them as mere exceptions to an all but universal rule. To some extent this opinion has permeated society, and although it has failed in preventing such unions, the popular view has of late years been tending to a conviction that degeneracy of race is to be largely attributed to the union of blood-relations. Thus Duvay, of Lyons, asserts "that in pure consanguinity, isolated from all circumstances of hereditary disease, resides, *ipso facto*, a principle of organic vitiation."

On the other hand, a not inconsiderable section regard this conclusion with doubt, and teach that consanguineous unions may be effected with impunity. We may place, as representing this party, and in antithetical relation to that of Duvay, the assertion of Dr. Gilbert Child, that "the marriages of blood-relations have no tendency, *per se*, to produce degeneration of race."

The arguments of the former are drawn from examples of a somewhat isolated character, and, in the language of their opponents, "attempt often to prove too much." No one, I think, with a previously unbiassed mind, can read the numerous examples which are cited to prove as the result of such unions sterility, deaf-mutism, idiocy, and other characteristics of degeneration, without coming to the conclusion that the cases from which they argue are selected ones, and that the cause they advocate is damaged by special pleading where there

should have been judicial deliberation. Writing from a standpoint of observation which enables me to give an opinion on the subject, and having regard to a great deal that has been written, I cannot but join Dr. Child in his very just remark, "to say that all but half the children of the marriages of cousins are idiotic, is simply to say the cases from which the statistics were drawn are not fair cases."

The arguments of the party, of which I have placed Dr. Child as the exponent, are mainly based on observations on the results of the modern system of breeding among the lower animals, and on the examples furnished by the Hebrew race and the North American Indians.

The racial degeneracy, which it is the purpose of this paper to examine in its relation to consanguineous unions, is that congenital mental defect, which, manifesting itself in different varieties as to intensity, has received the name of idiocy.

My notes refer to 1,138 cases of idiots, 753 being males, and 385 females, which I may say *en passant* is about the ratio, according to my experience, in which the sexes are affected by idiocy, viz., in the proportion of about two to one.

I have taken the records with every care as to accuracy, and from the number have excluded all cases in which there was impossibility in obtaining information or elements of doubt when obtained. Influenced only by these circumstances, I have eliminated 196 males and 90 females, leaving 557 males and 295 females, or a total of 852, on which the arguments will be based.

Of the 753 male idiots, 33 were the progeny of first cousins; in two of these instances there was another element elicited, viz., in one case the mother was also the product of first cousins, and in the other the mother was the product of cousins german, involving, therefore, in these two cases, an increased intensity of blood-relationship. Three cases were the progeny of second cousins. Four of third cousins. In all, 40 cases out of 753, or only rather more than 5 per cent, could by any possibility have been due to consanguineous unions. Of the 295 females, 13 were the progeny of first cousins, 3 were the children of second, and 4 those of third cousins. In all, 20 among 295, or little less than 7 per cent, could have been caused by the marriage of blood-relations.

The difference in the percentage of idiots, the progeny of

female sex is remarkable, but
existence of a preponderat-
males over females, in the
birth, and the consequent
contents during parturition.
certainty how frequently the
takes place in an ordinary com-
inquiry into the family
from different districts, who
belong to different families,
offspring of cousins; being half per
instance he is the son of
. In his case, there is no
mental degeneracy, and he
among the 200 as one of the

into the cases of idiocy
and endeavor to discover
besides that of consanguinity,
. For this purpose I quote
taken, without selection, from my
. Therefore, be fairly regarded as

born in London, father and mother
first cousins. The father's
Mother was frightened when
seeing her mother with
attributes the idiocy of the son, who
seems all healthy. J. V. T. is the

born at Calne, father and mother
were also distantly related.
mind, but his brothers and
. The mother died from
relatives died from consump-
born and a twin, the other twin
This child was remarkably small
many years. She has one
only.
born at Walworth. The

father and mother were first cousins. The father was delicate, sound in mind, but intemperate; his relations healthy. The mother healthy and of sound mind, had given birth to twins twice, her family generally consumptive. A. E. V. S. is the eighth-born, and one of his brothers died from consumption. The mother was frightened by a cat during the seventh month of her pregnancy, and was ill a week in consequence. She attributes the idiocy to her husband's habitual intemperance.

CASE IV.—M. A. S., female, born in London. Father and mother first cousins. Father of sound mind, died from pulmonary hemorrhage. One of his sisters died from consumption. Mother consumptive, has also lost one sister from consumption. M. A. S. is the fifth-born, and had four brothers and one sister; all have died from consumption.

CASE V.—F. H., female, born in Lancashire. Father and mother were second cousins. The father healthy and of sound mind; his father lost his sight when a young man (amaurosis?); two brothers died from consumption. Mother healthy and of sound mind, her aunt on father's side insane. The mother married twice, the first time to a person not related, and had three children, two girls healthy, and one boy who has epileptic fits. She afterward married her second cousin and had two girls, who are healthy, then a boy, who is decidedly idiotic, and then F. H., who has little or no mental power. F. H. is the seventh-born. Mother states that she believes the cause of the idiocy of the first idiot child was from fright, and that of the second from thinking of the idiocy of the former.

CASE VI.—C. E. H., female, born in Leicestershire. Father and mother first cousins. Father is a clerk in holy orders, healthy now, but was very delicate when at college; his uncle was imbecile, his father was eccentric, and acquired drinking habits; his aunt died from phthisis. The mother is very deaf; her sister died from cancer. C. E. H. has three brothers and two sisters of average physical and mental power. She was the first-born, and during the pregnancy the mother had great anxiety about pecuniary matters. The forceps were employed at parturition, and the head was greatly crushed.

CASE VII.—J. C., female, born in Surrey. Father and mother second cousins. Father had fits when a child, is very ailing, and feeble in mind. No family history. The mother not very strong, lost a brother from consumption. J. C. is

the sixth-born; her eldest brother died from acute hydrocephalus; the rest are all bright although not very strong. The mother says she saw, when seven months advanced in pregnancy, a girl precisely like her daughter both mentally and physically.

CASE VIII.—J. T. B., male, born at Wingham. Father and mother third cousins; father healthy and of sound mind, very deaf: his cousin became blind from study. Mother healthy, but all her relations consumptive. J. T. B. is the seventh-born, and is a twin-child; his twin-sister is very intelligent, as are also another sister and eight brothers.

CASE IX.—E. P. C., male, born at Tiverton. Father and mother first cousins; father died from Bright's disease after five years' illness; relations healthy. Mother healthy, but nervous: had bad health during her pregnancy, and was much distressed by her eldest child having croup in Paris, and not being able to procure a doctor. She had a very bad labor, owing to the large size of the child. There are two brothers and three sisters, all particularly intelligent. E. P. C. is the fourth-born.

CASE X.—W. G., male, born at Dorking. Father and mother were second cousins. Father healthy and of sound mind: has lost five brothers and sisters from consumption, and has one sister insane. The mother has had a fistula, is of sound mind. She was very low-spirited during pregnancy at the prospect of another child, with limited means for the support of the family. W. G. is the fourth-born, and has had three brothers and two sisters; one brother died from scarlatina, one is rather delicate, the rest are healthy and intelligent.

CASE XI.—W. A. P., male, born at Peckham. Father and mother first cousins. The father was healthy, but below the average in mental power; his relations were healthy. The mother has always been delicate, and is very nervous; had an aunt insane, all her brothers and sisters died young. W. A. P. is the eleventh-born, and has had four brothers and six sisters. The first born, a male, is an idiot, one brother died of inflammation of the lungs, one of convulsions at a fortnight old. Four sisters are dead—two were twins, one died at birth, and the other twin-child, when ten days old, of fits, one died from [illegible]: there are two sisters and one brother living, who are all intelligent.

CASE XII.—W. R., male, born in London. Father and mother were first cousins. Father has good health, but is very irritable and desponding; his mother died of consumption, and he lost one sister from congestion of the brain. Mother healthy, has lost one sister from consumption, and has an uncle imbecile. The mother suffered severely from sea-sickness when in the fourth month of pregnancy. The umbilical cord was obliged to be divided before the birth, animation was suspended and had to be resuscitated by artificial means. W. R. is the eleventh-born, has had eleven brothers and sisters, all of whom had average mental and bodily power.

CASE XIII.—R. S., male, born in London. Father and mother first cousins. The father healthy, sober, and steady, family healthy. The mother suffers from chronic bronchitis, sound in mind, and family healthy. The relative ages of father and mother at the birth of R. S. were 41 and 29. The labor was lingering, and ergot of rye given twice; the head was misshapen, and the child made a strange noise when born. R. S. is the fourth-born, and has had one brother and seven sisters. One had no bone on one side of the head, and lived only two days; four died at birth, but seemed all right. The rest quite healthy children. The first three born are the healthy ones, the rest have all been defective or have died. The mother miscarried with a child with one leg.

CASE XIV.—J. B., male, born at Tottenham. The father and mother were first cousins. The father has good health, but is of low intelligence; his relations healthy. The mother is delicate, and lost a brother and sister from consumption. J. B. was the third-born, and had one brother and four sisters; one boy had fits and died from consumption, one girl died from epilepsy at seven years, the rest healthy and bright.

CASE XV.—E. P., male, born at Bath. The father and mother are second cousins. The father has average health, but is a drunkard; six of his immediate relatives stammer. The mother has very poor health, and suffers from uterine disease; two of her sisters died young from consumption. The mother was ill during the whole of her pregnancy, fell down-stairs during the seventh month, was nervous, and was disturbed by hallucinations. E. P. was the second-born, and had three brothers and three sisters; one died of water on the brain, one of scarlet fever, and one of consumption. Three are idiots.

the second-born, and had one brother and three sisters; one sister is an idiot, and another was quite helpless, and died at the age of fourteen months.

CASE XX.—T. R., male, born at Thetford, Norfolk. Father and mother were first cousins. Father died from a contraction of the bowel, sound in mind, and steady; his mother used to stammer; mother very nervous; she was frightened during her pregnancy by seeing an idiotic man. Labor lasted twenty-eight hours, and she was delivered with instruments. T. R. is the first-born, and had three brothers and one sister; one brother died from whooping cough; the second and third were twins, and are very healthy; all sound in mind.

My own statistics differ so much from those published by Dr. Howe, of the United States, and on which many arguments have been based, that I am induced to place them in contrast:

Dr. Howe's 17 marriages produced 95 children—*i.e.*, 5.58 each. Of the 95 children,

37 were of tolerable health.
1 was a dwarf.
1 was deaf.
12 were scrofulous or puny.
44 were idiots.

Total 95

Thus more than 46 per cent were idiots.

The 20 marriages, relating to my own cases, produced 138 children—*i.e.*, 6.9 each. Of the 138 children,

75 had average health and intellect.
11 were consumptive.
8 were still-born.
4 died from convulsions or fits.
2 were hydrocephalic.
7 died young from infantile complaints.
6 were puny and delicate.
25 were idiots.

Total 138

It will be seen that only a little more than 18 per cent were idiots.

It will be interesting to place also in contrast the results of 20 marriages, in which there was no consanguinity, but in which there were one or more instances of mental defect in the progeny of each family, and which have been taken, like the former twenty cases, from a much larger number, without any principle of selection. The 20 non-sanguineous marriages produced 145 children, or 7.25 each. Of the 145 children,

83 had average health.
1 was consumptive.
11 were still-born.
3 died from convulsions or fits.
2 were hydrocephalic.
13 died from infantile complaints.
6 were puny, or dwarfed.
26 were idiots.

Total 145

It will be seen that 18 per cent were idiots. In the case of the consanguineous progeny, 55 per cent were of average health; in the non-consanguineous, 57 per cent. No one, I think, who has had an opportunity of investigating the subject, or who compares these statistics with Dr. Howe's, can avoid coming to the conclusion that Dr. Howe's 17 cases were not typical of what is to be met with in this country. Only 39 per cent of the progeny in his cases had average health.

I have shown that about 6 per cent of those suffering from congenital mental defect are the product of consanguineous marriages, while, among the healthy and vigorous, only about half per cent may be placed as the result of such unions. One cannot, therefore, resist the conviction that the union of blood-relations has some influence in the deterioration of our species. What that influence is, however, can only be determined by a further investigation into the etiology of the 20 cases I have cited.

Out of the 20 cases, among whom the average number of children were 6.9 each, no less than 5, or 25 per cent, were primiparæ. This of itself, according to my observation, is sometimes a cause of idiocy. It may be explained, I believe, by the greater injury sustained in the birth than at subsequent labors, and is analogous to the determining cause of

the preponderance of male over female idiots before alluded to. (In the statistics of the maternity department of the London Hospital ["London Hospital Reports," Vol. I., p. 254] it is stated that the still-born males exceeded the females by 35 per cent.) No less important is the fact, that in two cases the forceps were employed at the birth of the child, or in 10 per cent of the cases. I find from the statistical report of the maternity department of the London Hospital, by Mr. Heckford, published in the first volume of the "London Hospital Reports," that the forceps were employed only in 8 per cent of the children alive. It would not be difficult to prove, by reference to all the notes I possess, that instrumental interference is of itself a cause of idiocy. In two of the 20 cases, in which instruments were not employed, the head of the child was much misshapen by the difficulty of the labor.

One was a twin-child, and there is reason to believe that this condition may, of itself, be conducive to defective mental development. Suspended animation was reported in two cases, or 10 per cent; how far this may influence the future development of the child, I shall inquire into, in a future paper.

Ergot of rye was given in one case; but I am not aware of any observations on the use of this drug as a cause of idiocy.

This disposes of all the possible causes influencing the child at parturition. I have now to inquire into the hereditary influences which might have affected the ovum, and I think it will be readily granted that no breeder of cattle, apart from all question of breeding in and in, would select analogous stock for propagation from, to those which constitute the parents of the twenty cases I have quoted.

Thus, among the progenitors of the twenty, in no fewer than twelve instances, was phthisis abundantly established in the family history of one or both parents.

In 12 cases there was well-established history of insanity, epilepsy, or imbecility in the family of one or both progenitors reaching to the large amount of 60 per cent. In 2 cases the fathers were habitual drunkards. In one instance the mother was very deaf, and the same case furnished the solitary example of cancer.

There were only 4 cases in which there did not exist either a history of insanity or phthisis in the family. In the first of these the father's mother stammered when young, the mother

stated that she was nervous during her pregnancy, during which she was frightened by an idiotic man. The boy had four brothers and sisters, all of whom were healthy, and he was one of the cases delivered by forceps. In the second case there was no history of hereditary taint. There was, however, disparity in the ages of the parents: father was 41 and the mother 29. The labor was very lingering, and it was the one case in which ergot of rye was administered. (Dr. Ramsbotham has shown that the ergot of rye influences unfavorably the viability of the child.)

In the third case, the father was suffering from Bright's disease at the time of procreation, from which disease he died.

The fourth case is the only one in which the consanguinity stands as an isolated cause, and even in this instance there are three sisters perfectly sound, and it is the only example of degeneracy in the family, while the mother asserts that she was frightened by seeing her mother with paralysis at the age of 73. It is worthy of remark that the father's mother also died from paralysis at the age of 70. The boy is a microcephale and the last born; the father, about the time of the procreation, grew thriftless, ran away to Australia, and has not been heard of.

It is also noteworthy that these four exceptional examples are all males. Reviewing the whole of these cases, there is only one, and that the one just mentioned, in which there is not quite sufficient to account for the idiocy apart from consanguineous influences.

Since writing the foregoing, my attention has been called to a paper of Dr. Mitchell's, read before the Medico-Chirurgical Society of Edinburgh ("Edin. Med. Journ.," Vol. VIII., p. 872), in which, making observations from a similar point of view to myself, on a different field, he has arrived at very opposite conclusions. He found in Scotland that more than every sixth idiot born in wedlock was the child of cousins. I am unable to account for such a wide disparity, and in the face of it can only reiterate the care with which my information has been collected, and the impartiality with which my results are here presented. My own researches conclusively show that in England, at least, every fourteenth idiot only is the child of cousins. But can it be as certainly shown that the relationship *per se* is the cause of the idiocy? I think not,

and the analysis I have made clearly shows that in the vast majority of such, so great in fact that it may almost be said to be universal, other causes were operating which were merely intensified by the relationship. Had the same care been exercised in the selection of relations as is displayed by the breeder of race-horses, vastly different results might have ensued; or were the practice of the colored races of North America in force, of destroying all the weak, rachitic, and diseased children, the intermarriage of cousins would not have displayed the facts which I have furnished. Consanguinity has doubtless the power of aggravating any morbid tendency, as I believe it has of perfecting any good quality. Any statistics on the results of the marriage of relations are of doubtful value unless they give the life-history of the progenitors. What a different aspect the whole matter assumes when this plan is adopted, will be apparent to the readers of this paper. Whenever a similar investigation is made I believe it will be found, as in the subjects of my own inquiry, that consanguinity is only one of the factors, and not the most important one, in the production of deterioration.

If our advice is sought, it will be our duty to inquire into other elements which are less on the surface, but which have equal or even greater potentiality for evil.

Alliances, such as I have exhibited, with hereditary disease on both sides, should be discountenanced even where there is no element of consanguinity. It would only be a part of a true philosophy to render more forcible our opposition where blood-relationship would have a well-determined tendency to aggravate the wrong.

CHAPTER IX.

OBSERVATIONS ON AN ETHNIC CLASSIFICATION OF IDIOTS.

THOSE who have given any attention to congenital mental lesions must have been frequently puzzled how to arrange, in any satisfactory way, the different classes of this defect which have come under their observation. Nor will the difficulty be lessened by an appeal to what has been written on the subject. The systems of classification are generally so vague and artificial that not only do they assist but feebly in any mental arrangement of the phenomena which are presented, but they completely fail in exerting any practical influence on tho subject.

The medical practitioner who may be consulted in any given case, has, perhaps in a very early condition of the child's life, to give an opinion on points of vital importance as to the present condition and probable future of the little one. Moreover, he may be pressed as to the question, whether the supposed defect dates from any cause subsequent to the birth or not. Has the nurse dosed the child with opium? Has the little one met with any accident? Has the instrumental interference which maternal safety demanded been the cause of what seems to the anxious parents a vacant future? Can it be that when away from the family attendant medicine has been injudiciously prescribed? Can, in fact, the strange anomalies which the child presents be attributed to the numerous causes which maternal solicitude conjures to the imagination, in order to account for a condition, for which any cause is sought rather than hereditary taint or parental influence? Will the systems of classification, either all together, or any one of them, assist the medical adviser in the opinion he is to present, or the suggestions which he is to tender to the anxious parent? I think that they will entirely fail him in the matter, and that he will have in many cases to make a

guarded diagnosis and prognosis, so guarded, in fact as to be almost valueless; or to venture an authoritative assertion which the future may or may not confirm.

I have for some time had my attention directed to the possibility of making a classification of the feeble-minded, by arranging them around various ethnic standards—in other words, framing a natural system to supplement the information to be derived by an inquiry into the history of the case.

I have been able to find among the large number of idiots and imbeciles which come under my observation, both at Earlswood and the out-patient department of the hospital, that a considerable portion can be fairly referred to one of the great divisions of the human family other than the class from which they have sprung. Of course there are numerous representatives of the great Caucasian family. Several well-marked examples of the Ethiopian variety have come under my notice, presenting the characteristic malar bones, the prominent eyes, the puffy lips, and retreating chin. The woolly hair has also been present, although not always black, nor has the skin acquired pigmentary deposit. They have been specimens of white negroes, although of European descent.

Some arrange themselves around the Malay variety, and present in their soft, black, curly hair, their prominent upper jaws and capacious mouths, types of the family which people the South Sea Islands.

Nor have there been wanting the analogues of the people who, with shortened foreheads, prominent cheeks, deep-set eyes, and slightly apish nose, originally inhabited the American continent.

The great Mongolian family has numerous representatives, and it is to this division I wish, in this paper, to call special attention. A very large number of congenital idiots are typical Mongols. So marked is this that, when placed side by side, it is difficult to believe that the specimens compared are not children of the same parents. The number of idiots who arrange themselves around the Mongolian type is so great, and they present such a close resemblance to one another in mental power, that I shall describe an idiot member of this racial division, selected from the large number that have fallen under my observation.

The hair is not black, as in the real Mongol, but of a

brownish color, straight and scanty. The face is flat and broad, and destitute of prominence. The cheeks are roundish, and extended laterally. The eyes are obliquely placed, and the internal canthi more than normally distant from one another. The palpebral fissure is very narrow. The forehead is wrinkled transversely from the constant assistance which the levatores palpebrarum derive from the occipito-frontalis muscle in the opening of the eyes. The lips are large and thick with transverse fissures. The tongue is long, thick, and much roughened. The nose is small. The skin has a slight dirty yellowish tinge, and is deficient in elasticity, giving the appearance of being too large for the body.

The boy's aspect is such that it is difficult to realize that he is the child of Europeans, but so frequently are these characters presented that there can be no doubt that these ethnic features are the result of degeneration.

The Mongolian type of idiocy occurs in more than 10 per cent of the cases which are presented to me. They are always congenital idiots, and never result from accidents after uterine life. They are, for the most part, instances of degeneracy arising from tuberculosis in the parents. They are cases which very much repay judicious treatment. They require highly azotized food with a considerable amount of oleaginous material. They have considerable power of imitation, even bordering on being mimics. They are humerous, and a lively sense of the ridiculous often colors their mimicry. This faculty of imitation may be cultivated to a very great extent, and a practical direction given to the results obtained. They are usually able to speak; the speech is thick and indistinct, but may be improved very greatly by a well-directed scheme of tongue gymnastics. The co-ordinating faculty is abnormal, but not so defective that it cannot be greatly strengthened. By systematic training, considerable manipulative power may be obtained.

The circulation is feeble, and however much advance is made intellectually in the summer, some amount of retrogression may be expected in the winter. Their mental and physical capabilities are, in fact, directly as the temperature.

The improvement which training effects in them is greatly in excess of what would be predicated if one did not know the characteristics of the type. The life expectancy, however, is

far below the average, and the tendency is to the tuberculosis which I believe to be the hereditary origin of the degeneracy.

Apart from the practical bearing of this attempt at an ethnic classification, considerable philosophical interest attaches to it. The tendency in the present day is to reject the opinion that the various races are merely varieties of the human family having a common origin, and to insist that climatic, or other influences, are insufficient to account for the different types of man. Here, however, we have examples of retrogression, or, at all events, of departure from one type and the assumption of the characteristics of another. If these great racial divisions are fixed and definite, how comes it that disease is able to break down the barrier, and to simulate so closely the features of the members of another division? I cannot but think that the observations which I have recorded are indications that the differences in the races are not specific but variable.

These examples of the result of degeneracy among mankind, appear to me to furnish some arguments in favor of the unity of the human species.

CHAPTER X.

ON IDIOCY AND ITS RELATION TO TUBERCULOSIS.

THE causes which have been assigned as productive of idiocy are numerous, and some have received special advocacy. Thus we are asked to believe that one of the most profound misfortunes which afflicts our race—which to a great extent blots out the characteristics of man, and approximates him to the lower animals—arises from sucking the thumb; and that if we could prevent a "fruitless sucking" idiocy would be immensely diminished, even if it did not cease to exist. Others, with more show of reason, urge the intermarriage of blood-relations as the prevailing cause; and so far does a belief in the potency of this latter element permeate society that I have been often gravely asked whether intermarriage of relations is not the cause of the idiocy of three-fourths of the cases which come under my observation. No one who has had an opportunity of investigating the influences which are at work in the production of congenital mental diseases can fail to be struck with the fact that they are, for the most part, to be traced to some inherent vice of constitution in the progenitors. He will discover in the parents elements of degeneracy which must have had their share in producing the catastrophe. He will notice how by degrees the stock has deteriorated. He will be able to estimate how intemperance or sensuality leads slowly but surely to idiocy—how physical weakness of the parents culminates in the mental blight of the child.

Among the influences which have been regarded as connected with idiocy, very little attention has been given to that of tuberculosis, and I am not aware that any observations have been made with reference to the connection of these two maladies.

Several writers have discussed the relations between insanity and tuberculosis, and have, I think, made it tolerably

evident that there is more than an accidental connection between them.

At the Earlswood Asylum, where the following observations have been made, the subjects of the inquiry are not likely to present an unfair proportion of tubercular idiots. Rather would they be likely to be below the average. The inmates are, for the most part, elected after great exertion, and the friends of a phthisical idiot would scarcely be likely to undertake the trouble for a manifestly short-lived child, even if the rules of the institution did not exclude it.

During the past eight years, from 1859 to 1866 inclusive, there have been 201 deaths. During this time there have been two epidemics of measles, one of scarlet fever, and two of whooping-cough, which have all added to the mortality. Moreover, a large proportion of the patients who succumbed to these epidemic diseases were those who would, in all probability, have eventually died of phthisis but for their intervention. Notwithstanding this circumstance there remains the fact, which my notes record, that, of the whole mortality, 39.8 is due to phthisis. To appreciate fully the meaning of these figures, it is necessary to consider the rate of mortality which rules among an idiot population. My notes show that, taking the last eight years, in some of which there were epidemics, while others were entirely free therefrom, the mortality presented an average of about 73.3 per 1,000; whereas the mortality of the district in which the asylum is situated was about 18 per 1,000.

Date.	Average population.	Gross mortality.	Deaths from phthisis.	
1859	285¾	13	7	
1860	308¾	22	7	Epidemic of typhoid.
1861	318⅓	23	13	
1862	322	33	8	Epidemic of measles.
1863	344½	47	15	Epidemic of measles and scarlatina.
1864	369⅝	19	10	
1865	412¾	13	9	
1866	423½	31	11	Epidemic of measles.

The statistics of London show that the deaths from phthisis

constitute 115 per 1,000 of the general mortality. My notes of the causes of death at Earlswood indicate that phthisis was the actual cause of death in 398 per 1,000 of the general mortality. The significance, however, of this, as before observed, can only be rightly estimated by recollecting that the general mortality is four times that of an ordinary community.

It will be obvious that, in consequence of the greater readiness with which idiots succumb to epidemic or other diseases, the proportional deaths from phthisis are thereby much decreased. This element may be fully brought out by dividing the eight years; bringing together the four epidemic years, and comparing them with the four non-epidemic years. It will then be seen that during the epidemic years 1860, 1862, 1863, and 1866, the deaths from phthisis numbered 297 per 1,000 of the general mortality, or considerably more than twice the ratio which rules in London; while in the non-epidemic years 1859, 1861, 1864, and 1865, the deaths from phthisis reached the enormous proportion of 570.58 per thousand of the general mortality. I now propose to present a tabular view of the age and sex of those who died from phthisis.

Age.	Male.	Female.	Total.
7	1	0	1
8	1	0	1
9	1	2	3
10	3	0	3
11	2	1	3
12	3	1	4
13	6	2	8
14	5	2	7
15	1	0	1
16	4	1	5
17	2	6	8
18	4	3	7
19	8	1	9
20	7	1	8
21	6	2	8
23	2	0	2
27	1	0	1
29	1	0	1
	58	22	80

Dividing the ages into quinquennial periods, it will be observed that the greatest mortality from phthisis was from fifteen to twenty years of age.

From	5 to 10	years,	8
"	10 to 15	"	23
"	15 to 20	"	38
"	20 to 25	"	10
"	25 to 30	"	2

The above details have reference solely to ante-mortem diagnosis and have included cases where the death was evidently caused by phthisis. I have, however, made an analysis of the last hundred of my post-mortem records, and I find that no fewer than 62 per cent were subjects of tubercular deposit. There were 62 males, and tubercular deposit was found in 49 instances, or 79.03 per cent. There were 38 females, and of these 13, or 34 per cent, were tubercular.

Dr. Clouston, in the "Journal of Mental Science" for 1863, has analyzed the post-mortem records of the insane at the Royal Edinburgh Asylum, and found that 60.9 per cent had tubercular deposit. It would appear that idiots are slightly more liable to tuberculosis than the insane, but there is a remarkable difference between the proclivity of the two sexes. While among the insane, 51.7 per cent of the males were tubercular, 73 per cent of the females had tubercular deposit. Among idiots, however, while the females have a remarkable immunity, the deposit being found in only 34 per cent, among the males no less than 79.03 per cent, or more than twice the ratio, had tubercle in some of their organs.

If we inquire into the sex of those whose death resulted from phthisis and in whom the diagnosis was made during life, we shall also find that the females suffered in a less degree than the males. While 31.9 per cent of the female mortality resulted from phthisis, this disease was the cause of death in 44.6 per cent of the males.

The following table will give the distribution of the deposit in the different organs:

Total number of cases referred to, 100.

	Males.	Females.	Total.
Total number of cases found tubercular,	37	25	62
Lungs,	31	21	52
Lungs, much deposit,	24	14	38
Lungs, slight deposit,	7	7	14
Deposit in right lung,	26	17	43
Deposit in left lung,	27	21	48
Peritoneum,	4	3	7
Nervous centres,	3	3	6
Bronchial glands,	12	6	18
Liver,	5	4	9
Kidneys,	4	0	4
Spleen,	7	2	9

It is worthy of remark that tubercle is rarely found in the encephalon. In only two cases did this occur; in one the corpus striatum was the seat of the deposit, and in the other the cerebellum. The most noticeable character observed was the extreme pallor of the cortical substance of the encephalon; and so frequent was this that it was all but universal. Occasional softening of the fornix and the neighboring parts was met with, but not nearly so frequently as paleness of what should be the gray portion of the brain.

In several of the cases included in the above record, most careful inquiry failed to discover any family history of tuberculosis; and the brothers and sisters were thoroughly vigorous. In these cases the tuberculosis appears to have been the sequence of the idiocy—a condition of idiocy resulting from accidental causes. Defective innervation in all probability led to malnutrition, and predisposed to a tubercular condition. In some this was doubtless materially assisted by the imperfect mastication and insalivation to which the food was subjected. The tendency to bolt the food unmixed with saliva often prevents the proper alteration of the starchy element, so as to fit it for speedy assimilation.

On the other hand, in a large number of cases the progenitors had also manifested a tubercular condition; and in some the tuberculosis of the parents had been, in my opinion, the

prime cause of the idiocy of the offspring. I have elsewhere shown ("Lond. Hosp. Reports," Vol. III.) that a specific phase of idiocy—a phase which is curiously associated with altered racial characters—arises from tuberculosis of the progenitors.

The subjects of this class assume the Mongolian type; and while they present a marked similarity in external conformation, they are characterized by the same mental and moral peculiarities; so that, given a case of the Mongolian type, we are often able to trace its origin to tuberculosis, and to predicate the extent of response to training that may be expected, and the tendencies it will evince. Moreover, the knowledge that is gained by this racial character assists in laying down specific rules as to food, medicine, and general hygiene, without which the mental development would be but small. The power of progress is usually much greater than one would judge by an ordinary inspection. Such cases are extremely susceptible to climatic changes, and winter is for them a period of mental and physical developmental rest. In the spring they put forward increased imitative and receptive powers, which compensate to some extent for the period of hibernation.

It will be interesting now to ascertain to what extent tuberculosis exists among the progenitors of idiot children generally. I have gone through my records very carefully, disregarding all doubtful cases, meaning thereby cases in which, although there has been a death from phthisis in the family, I had reason to believe that it arose from accidental causes, and selecting only those in which the tubercular taint was well impressed. I find that in 31 per cent of the cases of idiocy which have come under my care, or about whom I have been consulted, tuberculosis existed in an unmistakable manner, in the family of the progenitors; in 6 per cent the tubercular element was found on both sides of the family; in 10 per cent it was due to the father; while in 15 per cent the tuberculosis belonged to the mother. It is a somewhat singular circumstance that while tuberculosis is more frequent on the maternal side, the male progeny are the most tubercular.

In the third volume of the "London Hospital Reports," I have endeavored to show that idiocy has been too often traced to the intermarriage of blood-relations, without regarding other elements that may be operative. It is readily conceiv-

able that if there be tuberculosis strongly impressed on a family, the members of that family would by intermarriage be taking tolerably effectual steps to insure the extinction of their race. Certain it is that in a large number of the cases in which marriages of consanguinity are referred to as the cause of idiocy, the tuberculosis of the progenitors is a potent, but often disregarded, element. The Mongolian type, which I have elsewhere described, occurs, according to my observation, in greater degree when the tubercular element is strongly impressed, still more where it exists in both branches of the family, and greatest if consanguinity is added thereto.

It appears to me that tuberculosis must be accepted as one important cause of idiocy; that it impresses special characters thereon, characters which impart a strong family likeness to the subjects of this class.

It is no less clear to me that idiocy of a non-tubercular origin leads to tuberculosis. Whether this arises through the influence of the pneumogastric nerve, mal-assimilation of food, or defective innervation, it cannot but be regarded that the connection between these two maladies is by no means accidental, and that a due appreciation of this relation is necessary to those who would treat effectively congenital mental lesions.

CHAPTER XI.

A CASE OF ASYMMETRICALLY DEVELOPED BRAIN.

THE brain now exhibited was removed from the cranium of a girl seventeen years of age, who had been idiotic from birth. Her father died insane. Her mother had good bodily and mental health. She was the youngest of six children. The other members of the family had average intellectual powers, but were all delicate as to their physical health; one brother died from phthisis. At the age of seven months she had epileptic fits, which persisted for some time at short intervals. She never spoke. The cutting of her teeth and her walking were both deferred. She was passionate and self-willed. She was always in motion, full of mischief, and delighted in tearing things up and putting them on the fire. Her habits were dirty. Under the influence of training she became clean, tractable, and able to take some part in her own toilet. She was taught to feed herself with propriety at table. She made no attempt to speak, apparently from want of ideas to communicate. She would come when called, but manifested very little affection. Her demeanor indicated considerable erotic feeling. There was no paralysis either of sensation or motion, and her powers of prehension and manipulation were susceptible of education.

Her physical health had been very good for several years, until an attack of scarlet fever led to acute desquamative nephritis, and consequent broncho-pneumonia.

Post-mortem Examination.—The body was well nourished, and weighed 6 stones 12 pounds. There was hair on the pubis, but not in the axillæ. The heart weighed 7½ ounces, the valves competent; the large vessels filled with clots of blood. The left lung was adherent to the costal pleura, weighing 14¾ ounces; interlobular adhesions. The apex was much puckered, corresponding thereto was a calcareous mass the size of a pea, of a hard density; another part of the apex contained a

tubercular nodule the size of a bean. The posterior part of the lung was intensely congested. The right lung was hepatized throughout seven-eighths of its extent. The bronchial glands were enlarged, and the tubes intensely injected. The kidneys presented at the margin of the pyramids a deep red color. The uterus and ovaries were normal.

The cranium was slightly unsymmetrical, exhibiting slight flattening on the anterior third of the left side. The circumference was 21¾ inches; the antero-posterior diameter 6.5 inches; the antero-posterior curve 10¾ inches; the bilateral diameter 5.3 inches; the bilateral curve 7.5 inches. On removing the calvarium the anterior portion of the left side corresponding to the external flattening was found to be enormously thickened.

The left side of the encephalon was consequently much smaller than the right, and on removing the brain it was found that this disparity was still further increased by a diminution of brain matter on the inferior surface of the anterior lobe, which was replaced by excessive thickening and consequent elevation of the orbital plate of the frontal bone.

The left hemisphere was not more than two-thirds the size of the right. The occipital lobe was slightly less developed on the left side than on the right, but the great cause of want of symmetry was the absence of development of the frontal lobe. All the convolutions were present, but the middle and inferior frontal gyri were extremely minute in size, although not more simple than usual. The gyri of the orbital lobule were also of small size.

Remarks.—Asymmetrical brains are not infrequently met with in dissections of idiots, but so great an equality has never before come under my notice. There was no want of symmetry in the lobes of the cerebellum. In this case it was arrest of growth rather than of development, as indicated by the complexity of the defective convolutions. The amount of disparity could not have been predicated before death by external examination of the cranium. The thickened calvarium and orbital plate were sequential to and not antecedent to the arrested growth.

A remarkable case of asymmetrical brain, which came under my notice a few years since, had associated with it an asymmetrical cranium, but the larger side of cranium corre-

sponded to the diminished hemisphere of the encephalon; the inner and outer tables of the skull had separated widely, so that external examination gave no idea of the size of the skull cavity.

It is worthy of remark that the region implicated was that known as Broca's. Having regard, however, to the frequency of absence of speech in idiocy, I cannot look upon this case as being of much importance in localizing the faculty of speech to one-half of the hemisphere, or to the frontal lobe in particular. The absence of speech was the result of defect of cerebration generally. There was no power to formulate ideas, and speech was not required. It should also be noticed that she was the youngest child of a father who died insane. There is reason to believe that she was procreated during the early progress of the mental alienation, and thus suffered in a way different from the others, who were born anterior to the mental change. This is in accordance with many instances which have come under my observation, and what might be theoretically expected.

CHAPTER XII.

A CASE OF MICROCEPHALIC SKULL.

THE cranium exhibited is that of a boy thirteen years of age, having a height of 45½ inches, and a weight of 26 pounds, who died from tubercular disease of the lungs. He was the son of healthy parents, but had been an idiot from birth. The cause of idiocy was attributed to fright of the mother during pregnancy. He was dirty in his habits, did not speak, and was extremely mischievous. The circumference of his head measured 18 inches, the longitudinal curve 11 inches, the longitudinal diameter 6 inches, the bilateral curve 10 inches, the bilateral diameter 4.8 inches; the brain weighed 2½ pounds; the fornix was diffluent, the middle commissure absent, the right corpus striatum smaller than the left; the pons Varolii and medulla oblongata weighed together three-quarters of an ounce; the cerebellum weighed 3¾ ounces, the right lobe being narrower anteriorly than the left. The calvarium, when deprived of integument, measured 17 inches; the longitudinal diameter 5⅞ inches, the bilateral diameter 4⅝ inches. The calvarium was unsymmetrical, being larger on the left side posteriorly, and the left parietal eminence being more prominent than the right. The anterior portion of the cranium had a remarkable prow-shaped prominence, corresponding to the medio-frontal suture which remained unossified; all the remaining sutures were in the same condition.

Remarks.—The above case is interesting, not as exhibiting a very extreme degree of microcephalism, but as evidence that premature synostosis of the cranial sutures cannot be regarded as the cause of the abnormal condition. In this case, not only were the usual sutures in an unossified condition; but the medio-frontal suture, which usually becomes ossified during the first year of extra-uterine life, was patent, so that deferred rather than premature synostosis existed. More-

over, it throws doubt on the view usually entertained, that scapho-cephalic skulls depend on the premature ossification of the sagittal suture, as in this case the marked frontal ridge corresponded to a line where synostosis had been remarkably postponed.

CHAPTER XIII.

A CASE OF MICROCEPHALIC SKULL.

THE cause of deformation of the cranium, and especially of that kind known as microcephalism, has been so authoritatively stated to be premature synostosis of the cranial sutures, that the tendency has been to acquiesce in this explanation and to accept this as the great determining factor. My own observations on the crania of about 200 idiots—many of them deformed in various ways, and some of them unusually small—have led me to take an entirely different view, and to assume that the deviations of the cranium have been rather the sequence of circumstances arresting the development and growth of the encephalon, and have not been the result of premature ossification of the sutures. The only case in which I have met with ossification of the sutures was a case of macrocephalism, where certainly the ossification of the sutures could have had no influence in the production of the enlarged cephalic mass.

The cranium which I now produce is interesting, as showing how an extreme degree of microcephalism can exist without any ossification of the cranial sutures. The cranium is that of a male, eighteen years of age, who had been educated with some slight result. He had acquired speech and correct habits, had learned to be self-helpful, to count, and to make imitative drawings of a simple character on a blackboard. The head measured in its circumference 15 inches. The antero-posterior curve measured from the glabella of the frontal bone over the vertex to the occipital protuberance 8 inches. The bilateral curve over the vertex from above the implantation of the ears was 8 inches. The antero-posterior diameter of the head was 5 inches, the bilateral diameter 3.9 inches.

The greatest antero-posterior diameter of the interior of the cranium was 4.7 inches; the greatest bilateral diameter of the interior of the cranium 3.4 inches.

All the sutures which are usually unossified were perfectly

free from synostoses, and, in fact, the cranial bones were more than usually freely separable the one from the other.

It is worthy of remark that more than one foreign observer had predicated during the youth's life that it was a good illustration of premature synostosis. I had been led to doubt this from the result of former autopsies, and I am desirous of placing on record this extreme degree of microcephalism, without any synostosis, as a striking example in which other than mere mechanical causes must be looked for as productive of this and analogous cases.

CHAPTER XIV.

A CASE OF ARRESTED DEVELOPMENT.

J. P., a female, aged five, came under my observation at the London Hospital. She measured twenty-two inches in height, was unable to walk, but could stand by the help of a chair. She could not speak, and gave utterance only to a few monosyllabic sounds. There was no deformity of the body or limbs. The face had an earthy complexion, and the integument generally had a wrinkled appearance as if it were too large for the diminutive body. The hair was sparse and coarse, the eyebrows obliquely placed, the tongue large and rugous. There was a small tumor on each side of the neck above the clavicle. She understood what was said to her, and had the mental condition of a child about fifteen months old. The father and mother had been healthy, and there was no history of mental or physical deviation on either side. The mother stated that her first child was perfectly healthy, until it died from measles. The husband about that time gave himself up to intemperance, and the mother subsequently gave birth to a child, which died at the age of three, having the same physical peculiarities as the subject of these remarks. The third child, now under consideration, was procreated like the second, while the husband was suffering from alcoholic intoxication. A miscarriage succeeded. The husband at this time relinquished his habits of intemperance, became as thrifty and prudent as he was formerly the reverse; and the wife again becoming pregnant, gave birth to a child normally developed, and in good bodily and mental health, now sixteen months old.

Remarks.—The above case is of great interest, because, in the author's opinion, it adds another to a group of cases which have come under his observation of arrested development arising from intoxication of one or both of the progenitors at the time of the procreative act. The whole group of cases

has presented features of such close resemblance that it is difficult to avoid the conclusion that there was some unity of cause, and careful investigation has elicited facts bearing on the etiology of these cases, having a close parallelism to the circumstances, which he believes to have been potential in this. He has known some of these cases to attain the age of twenty, while still preserving infantile characteristics.

In each case the tumors in the neck have been observed.

CHAPTER XV.

A CASE OF PARALYSIS WITH APPARENT MUSCULAR HYPERTROPHY.

BENJAMIN ROUND, aged eleven, admitted into the London Hospital, September 14th, 1869.

History.—His mother states that this disorder has been coming on for five years. The first thing wrong which she noticed was, that when he fell down he could not get up again. About two years ago he began to get unsteady in his gait; when running, if he tried to stop himself suddenly, he fell down, and even when walking he had difficulty in stopping without tumbling over. Running was easier to him than walking, and walking than standing still. When he stood still, he looked out for something to lean against, getting to the wall if he could. His mother noticed that as he ran he used to stick out his belly and throw back his shoulders. For the past twelve months he has been unable to walk, and for the past seven months has been gradually losing the use of his arms.

Family History.—His mother's health has always been good, and so has his father's. No history of any hereditary disease, except that his grandfather died from "consumption," and his father's grandfather was insane. All his brothers and sisters are healthy.

The only previous illness the boy has had was measles seven years ago. Has never had thrush nor any cutaneous eruption. Has had thread-worms for six years. His mother suckled him for eighteen months. He was not any longer teething or learning to walk than the other children. He has always been very fat; his belly has always been big, and the calves of his legs have always been large. During the last four years his mother thinks his ankles and thighs have wasted. His head is unusually large. During the past two years he has not been well fed; the family have only had meat once a week, and then a pound and a half divided among ten.

Present Condition.—He is utterly unable to stand. When put upon his legs they sprawl helplessly in every direction. He can sit up, but if he is gently pushed back he falls quite passively upon the floor, and can by no efforts raise himself. As he sits up, he likes to support himself by using his hands as props. When pushed back in bed against the pillow, so that he does not fall quite down, he can manage to raise himself by swinging his head laterally to the front. There is great loss of power over the arms. On being desired to raise his arm slowly, he can move it but a little distance from his side, and that by the aid of his scapular muscles, the shoulder being raised and thrown forward, and the lower angle of the scapula tilted upward and outward. By a jerk he can raise it about sixty degrees, and by swinging his arm backward and forward, he can get it up nearly horizontally. If his arm be extended in the supine position he can flex it at the elbow-joint, but if a small book be placed in his hand he cannot raise it. If his arm be flexed at the elbow he can extend it, but a weight of three or four ounces prevents his doing so. He can perform any movements with his fingers and thumb, but without much power. When he wishes to raise his hand he does so by the aid of his fingers, making them climb, as it were, over his body and head, and drag his arm after them. He separates his fingers, and places his thumb on a higher point than the rest; he then approximates his fingers, and resting his little finger on the same level as his thumb, again separates his fingers, and plants his thumb on a higher level still; in this way he makes his arm travel to the desired place. He cannot flex the thigh upon the trunk at all in bed; out of bed he can do it a little. As he lies in bed he moves his lower extremities about by the movements of his feet, alternately using the heel and toe as a fixed point to advance the rest of the foot. He can rotate the limb at the hip-joint. Out of bed, by swinging his legs, he can get them to an angle of about forty-five degrees from the perpendicular, but he cannot keep them in opposition to the force of gravity. He can also swing his feet laterally. He can move his feet a little laterally at the ankle-joint, but without much power. He flexes and extends his toes readily. He can adduct the limb slightly, but appears to do so by the action of his quadriceps.

Muscular System—Lower Extremities.—The muscles sup-

plied by the gluteal and great sciatic nerves are immensely hypertrophied. On looking at the boy the prominence of his gluteal region is very apparent, and on feeling the part the extreme hardness of the muscle is very striking. The lumbo-sacral curve is greatly exaggerated. The tensor vaginæ femoris can be felt as a thick, hard, firm band under the skin. The flexors of the thighs are also much hypertrophied. The muscles of the calves are also very hard and very large. The extensor and peronei muscles on the outside of the tibia appear to share this hypertrophy. The foot is in a state of talipes equino-varus.

The adductor muscles on the inside of the thigh are very soft, small, and lax. The quadriceps extensor appears somewhat hypertrophied, but it is very difficult to estimate its size. The sartorius is wasted.

Measurements of lower extremities:

From one iliac spine to the other, . . .	= 8	inches.
Around pelvis, over most prominent part of glutæi, ...	= 24½	"
From anterior superior iliac spine to outer condyle, ...	= 12¼	"
From great trochanter to outer condyle, .	= 10¾	"
Circumference at middle thigh, . . .	= 12	
Tibia, from inner tuberosity to inner malleolus, ...	= 9½	"
Circumference of thickest part of leg, . .	= 11	"
Circumference of leg just above ankle, . .	= 6	"

Upper Extremities.—The deltoid seems a little hypertrophied, but not so much as the glutæi. The triceps seems also somewhat hypertrophied. The pectorals and scapular muscles almost completely atrophied, and the latissimus dorsi can scarcely be felt. The head of the humerus can be felt with perfect ease, and can be partially dislocated and reduced, the ligaments being very lax; the bony points around the joint can be very easily felt. The biceps and coraco-brachialis are also very much wasted. The muscles of the forearm and of the thumb and fingers are fairly developed, and of their natural size.

Measurements of upper extremities:

From acromion to outer condyle, . . .	= 8¼ inches.
Circumference at middle of arm, . . .	= 6 "
Length of ulna, ...	= 7¼ "
Circumference of forearm just below condyles,	= 6¾ "

Trunk.—As before said, the lumbo-sacral curve is greatly exaggerated. The erector spinæ is immensely hypertrophied, and can be felt as a thick, hard mass on each side of the spine. The spinous processes of the vertebræ lie in a groove between these masses of muscle. In the space between the crest of the ilium and the last rib the thick hard edge of the erector spinæ can be felt distinctly. The belly is big, but the muscles forming its wall do not appear to be either wasted or hypertrophied. The cremasters act readily. The chest is broad and deep, and the costal angle exceedingly obtuse; its conical shape can be very distinctly seen, owing to the wasting of the pectorals. The serratus magnus is large, and its serrations can be seen with great clearness through the skin; it is not hard, like the erector spinæ, but appears to act naturally. The action of the diaphragm in respiration was carefully watched, and found to be the same as in a healthy person. The intercostals appear to act fairly.

Measurements of chest:

From acromion to acromion, ...	= 10 inches.
Circumference just below axilla:	
On expiration, ...	= 24 inches.
On inspiration, ...	= 25½ "
Circumference on a level with ensiform cartilage:	
On expiration, ...	= 26 inches.
On inspiration, ...	= 27½ "

Head and Neck.—The sterno-mastoid is rather wasted. The depressors of the os hyoides are capable of fairly vigorous action. It is doubtful whether there is anything abnormal with the trapezius, and the other muscles of that group; if anything they are hypertrophied. His temporal muscles are undoubtedly hypertrophied, and, seen from the front, form a small tumor outside each orbit. His masseters seem somewhat increased in size, but this is difficult to ascertain. The facial muscles of expression appear sluggish in their action.

His orbiculares are wasted; he can shut his eyes, but cannot screw them up tightly. He cannot frown, and can elevate his eyebrows but little. The muscles acting on the mouth do not seem defective at first sight, but on making him go through various grimaces, it is seen that he has not the command over the upper lip that he has over the lower; this, perhaps, is from misapprehension of directions. He puts out his tongue in a peculiar way, it always being concave, and he does not protrude it beyond his lips unless told to put it out further, when he makes an effort; but it is never convex from side to side. No affection of any ocular muscle.

General Appearance, etc.—He is a dull, heavy-looking boy, with a stolid, but somewhat cunning expression of countenance. His face is very fat, especially about the lower part; complexion sallow and pasty; skin thick, superficial veins cannot be distinctly seen through it. His head is very large (circumference where the hat fits twenty-one inches); its shape is broad rather than long. Hair thick, brown, and straight. Forehead rather high. Eyes brown, pupils large, eyelashes long, eyebrows thick at outer part, thick toward the median line. Nose flat and broad, especially broad at the bridge; alæ nasi thin, nasal aperture large. Ears small, but well shaped, lobules not ill developed. Lips thick, upper lip thicker than lower, angles of mouth somewhat inclined downward. Thyroid gland enlarged but not greatly. Voice natural, clear, low-pitched. Bones of extremities well shaped; epiphyses not unduly large.

Mental Condition.—He is stupid or dull, but rather cunning. He is generally good-tempered, but is often passionate, and at times very sulky; he appears to possess a strong will (he has probably been spoilt at home). He is not timid or bashful in any way. He smiles when spoken to, answers questions readily, and he takes any experiments tried upon him in very good part. He cannot read, but knows his letters. He has appreciation of music, and amuses the other patients by his singing, whistling, etc.

Nervous System.—He sleeps well. Has no fits or cramps of any kind. Sight good, ophthalmoscopic appearance normal. Hearing, taste, and smell good. Sensation, both painful, tactile, and thermic, appears to be very good all over the body. It cannot be estimated with the compasses, because

the boy, whether from laziness or any other motive, does not (or perhaps cannot) give consistent answers. The atrophied muscles do not respond at all to electricity. The gastrocnemii and hamstring muscles contract under it. The other hypertrophied muscles were not tested with it.

Digestion and appetite good. Bowels regular.

Urine.—Sp. gr. generally rather high; acid; no albumin, no sugar.

Respirations, 18 per minute, taken minutely; no cough or dyspnœa.

Heart.—Cardiac dulness reaches above to third rib; on the right to an inch beyond the sternum; on the left to within half an inch of nipple; apex beat under fifth rib, one inch to right of nipple, 88 per minute. Impulse normal. Sounds sharp and clearly defined, somewhat exaggerated. No murmur or thrill of any kind.

Temperature, taken at different times, always normal.

Remarks.—This case, for the very careful notes of which I am indebted to my clinical clerk, Mr. Herman, is a very typical example of the disease so well described by Dr. Duchenne in the Transactions of the Pathological Society. By the aid of the harpoon I extracted specimens of the muscle from both gastrocnemii. When examined by the microscope, it was noticed that the transverse striation of the muscular fibre was very indistinct, that there was a great increase of connective-tissue elements, and that there were numerous fat-globules, but they were distinctly external to the sarcolemma. There was no fatty degeneration of the muscular structure.

The treatment has been dietetical with the daily use of the faradic current. No improvement, however, has resulted. I think the best name for such cases is pseudo-hypertrophic paralysis.

CHAPTER XVI.

A CASE OF PSEUDO-HYPERTROPHIC PARALYSIS.

SAMUEL RICHARDSON, aged eleven, admitted into the London Hospital 22d February, 1870. There is no family history of insanity, nor any mental affection. The father appears a man of average intelligence; the mother is certainly below the average. She appears a woman of a desponding, irresolute disposition, and of very slow perception; I should think her inclined to melancholia. She is thirty-seven, and has had six children; this one is the eldest. It was born at full time, after a tedious labor, lasting two days and a half, and was delivered with instruments. She has had one miscarriage, and one child, her fourth, died, aged one year and a half, from "fits," which it had had from a month old; at the time it died it had not cut any of its teeth. All the rest are living. She states that while pregnant with this child she was in very delicate health, but she is unable to describe any definite ailment. She has always had plenty of food. The father is a mason, aged thirty-three; has always had good health. During the first two or three years of his marriage he used to be very frequently intoxicated. This child was two years old before he had any teeth, or before he could walk, and he was always very fretful. The mother says that while he was teething, and afterward, he used to suffer from attacks of "inflammation," but I cannot make out what she means by this. She does not think that in intellectual capacity he is behind the other children. Five years ago he had rheumatic fever; was in bed six months, all his joints being affected. Previous to that was quite well. Since then has suffered at times with rheumatic pains in different joints, and has been weak and delicate. About twelve months ago his parents first noticed that when he walked he used to "bend his back in;" his stomach sticking out in front and his buttocks behind. About nine months ago it was first observed that when running, his legs would give way, and he would fall with his legs under

him. About eight months ago he began to complain of his back hurting him. About this time, his mother says, he began to lose strength in his arms. His walking has since gradually got worse; he began to be unable to run before he was unable to walk. His falls became more and more frequent; at last he would fall down about every five or six yards. For the past two months he has been unable to walk without assistance, and for the past fortnight has been unable to walk at all. For some time past, his mother says, he has been losing flesh. She says he has lost flesh in his calves and buttocks as well as in other places.

He is rather small for his age. His height is 3 feet 10½ inches. His aspect is that of a dull, backward child. He has a vacant, apathetic, timid expression of face. Complexion fair, cheeks fresh-colored; hair brown, thick, straight, and fine; eyelashes long and fine; eyebrows thin, a wide interval between them in the middle line. Pupils large, irides dark, sclerotics of a bluish tint; eyeballs prominent. Nose broad, especially at the bridge, alæ nasi thick; nasal apertures large. Forehead high, round, protuberant; face fat, especially at lower part; lips thick, upper lip the thicker, and is broad and long. Bones well shaped; epiphyses not unduly large. Finger ends square. Costal angle acute. Palatal arch contracted; teeth crowded and irregular; skin thick, superficial veins can be seen, but not distinctly. Ears of moderate size, lobules small. Circumference of head where hat fits, 20½ inches.

He cannot stand by himself. When told to try and stand by himself, he bends forward, and stands on tiptoe, but he cannot succeed. If he be held up by the arms there is a tendency to bend his body at the hips. If he be made to put his heels to the ground the tendency is greater. If left unsupported, his body bends forward at the hips, and he falls with his legs under him; but he can stand if support be given by the hand pressing his buttocks forward, though he does so in a tottering way. He can sit up without assistance, but he likes to have one hand behind him as a kind of prop. If he be laid down on his back, he cannot get up by himself without great exertion; he accomplishes it by turning on his side, and by pulling at the clothes brings his body to the proper angle with his legs, he then clutches at the bedclothes and pulls himself up by them.

His body is wasted, but not markedly so. The lumbo-sacral curve is slightly exaggerated; the gluteal region is larger and more rounded than is consistent with his wasted condition, and it is very hard. The erector spinæ is about as large as it should be for a boy of his age, but is much harder and firmer than it ought to be. The abdomen is large. It is difficult to estimate the size of the abdominal muscles, but they are capable of fairly vigorous action (measurement around pelvis over most prominent part of glutei, twenty-two inches; from one iliac spine to the other, eight inches). He moves his legs about badly, and without much power. If asked to cross his legs, he takes hold of one with his hands and lifts it over the other. He can perform this movement without the aid of his hands, but does so slowly, and with apparent exertion. As he lies on the bed, if told to draw up his legs, he does this with more force than he can any other movement. On sitting him on the edge of the bed he can raise his feet to a right angle with his body, *i.e.*—extend his knees; but a one-pound weight attached to his great toe is sufficient to prevent him. On placing him on his face, he can flex his leg on the thigh, but a two-pound weight attached to his great toe prevents him. He can move his feet laterally at the ankle-joint, and does this pretty well. He can extend and flex his foot a little at the ankle, but he does not do this nearly so well as he should. He can move his toes but slightly.

On examining the muscles, the tensor vaginæ femoris is felt enlarged and very hard. The sartorius he can put in action, and it does not seem wasted. The quadriceps extensor seems harder than it should be, but this is difficult to estimate, as is the size of the muscle. The flexor muscles of the thigh are larger than ordinary. The adductors are small, but contract well when he puts them in action. The gastrocnemii are large and very hard; the extensor muscles and the peronei are also hard, and are certainly not wasted. The foot is in a state of talipes equino-varus: the tendo Achillis is very tense. The extensor brevis appears wasted, but it is difficult to tell. (*Measurements.*—From trochanter major to external condyle, 10¾ inches; from anterior superior spine of ilium to external condyle, 12¼ inches; circumference at middle of thigh, 9½ inches; length of tibia, from inner tuberosity to inner malleolus, 10¼ inches; circumference at thickest part of calf, 8⅝ inches; just above ankle, 5⅜ inches.)

His chest is long and narrow; costal angle very acute. Breathing mostly abdominal. When told to take a deep breath, he does so with his diaphragm; the chest moves but slightly, and the intercostal spaces sink in. The serratus magnus can be felt, and appears about normal.

He can move his hands and arms in any direction, but has not much strength in them. He can take a two-pound weight and elevate it above his head, but no heavier weight. A boy aged nine, in the same ward, suffering from pulmonary disease, can lift six pounds; on resisting the action of the triceps with a two-pound weight, he can just extend his arm. As to the biceps, he cannot flex his arm against two pounds, but he can against one pound. He can move his fingers readily, but has not much strength in them.

On examination of the muscles, the pectorals, biceps, and coraco-brachialis are most markedly wasted. The deltoid is hypertrophied, also the triceps, in a very noticeable manner. The latissimus dorsi is wasted, also the sterno-mastoid, very decidedly. The scapular muscles are hypertrophied, as is the trapezius. The muscles of the forearm and hand seem neither hypertrophied nor wasted. (*Measurements.*—Circumference of thorax: just below axillæ, on inspiration, 20½ inches, on expiration, 20¼ inches; at level of ensiform cartilage, on inspiration, 23½ inches, on expiration, 22½ inches; from acromion to acromion, 10 inches; from acromion to outer condyle, 8¼ inches; circumference at middle of upper arm, right, 5⅜ inches; left, 6⅛ inches; length of ulna, 7¼ inches; circumference of thickest part of forearm, 6 inches; circumference of neck, 10¼ inches.)

His facial muscles of expression appear sluggish in their action. He can screw his eyes up firmly, and can elevate his eyebrows, but I cannot get him to frown; whether he can or cannot I do not know. He seems to have but little power over his lips. His face seems remarkably devoid of expression; on trying to make him grimace, he either will not or cannot contort his face as told. When he laughs he does so in a feeble sort of way; I cannot make him laugh aloud, or put on a broad grin, but the other patients say that he does. His temporals and masseters seem normal. His thyroid gland does not seem enlarged. He puts his tongue out in a feeble manner; he puts it out slowly, and a very little distance, but he can put it out far if he likes.

Mentally he is certainly below the average of a boy of his age. He is very slow in his answers; seems afraid of every one, and often cries. The men in the ward remark that the other boy (Round), although more paralyzed, is "the best man of the two." He knows his letters, but cannot read. He can do very simple sums in arithmetic, such as that two and two make four, but three and four he says make eight. He is cunning, although stupid.

He sleeps well. Has no fits or cramps of any kinds. No paralysis of any ocular muscle. Fundus oculi normal. Hearing, taste, and smell good. Sensation of every kind, painful, tactile, thermic, and electric, seems unimpaired: he does not answer properly, so that it is impossible to estimate it for purposes of comparison. Induced electricity applied to muscles does not produce contraction.

Appetite and digestion good, bowels regular.

Urine.—Sp. gr. about 1020; acid, no deposit, no albumin, no sugar.

Pulse 96. Cardiac dulness extends above to third rib; on the right, to right margin of sternum; on the left, to half an inch beyond the nipple; below, to the sixth rib. Apex-beat under fifth rib, half an inch to the right of the nipple. The impulse is increased, but is not heaving, nor is there a thrill. The first sound is doubled, but there is no decided murmur.

Respirations 20 per minute. No cough, no dyspnœa. Temperature normal.

Remarks.—This case presents a very good example of pseudo-hypertrophic paralysis in an earlier condition than that of "Round," previously reported. I am again indebted to my clinical clerk, Mr. Herman, for the very careful notes of the case. I did not extract any specimens of muscle, in consequence of rather troublesome wounds having been produced in the previous case.

It is worthy of being noted that this is the seventh case of pseudo-hypertrophic paralysis which has come under my observation, and that in each case there has existed more or less mental feebleness.

The treatment has been dietetical, with the daily employment of faradization. No perceptible improvement of any kind has been observed.

CHAPTER XVII.

THE RELATION OF THE TEETH AND MOUTH TO MENTAL DEVELOPMENT.

WHEN the president of the Odontological Society did me the honor of requesting me to read a paper before that society, I felt at first some reluctance, from the consciousness that one of a very practical character was not within the scope of my power.

It occurred to me, however, that there was a branch of inquiry in which I felt considerable interest, and which had some slight bearing on the department of medical science represented by this society. I thought, moreover, that I should derive great gain myself in bringing my observations before it, from the fact that while some of my work has been with a somewhat special class of humanity, its members would be able to correct or confirm my views from observations over a wider and more varied field. It is thus, by the comparison of results obtained from opposite standpoints, that broad principles may be elicited, where otherwise narrow, and possibly mistaken, views might be entertained.

At an early period of my study of the mental affections of childhood and youth, I became convinced that the question involved a far larger region of inquiry than the mere psychological phenomena which were presented before me—that, interesting as were the examples of mental deviations which were the every-day object of one's contemplation, they were really only a part of the great subject; and one became convinced, from observation, that the physical deviations were as interesting and important as the psychical, in relation to the study of mental alienation, and especially to that form of it which had a congenital origin or proclivity. It became clear to me that idiocy and imbecility were not simply disturbances of brain-power—were not simply nerve-lesions in the narrowed acceptation of the term—but were profound

diseases involving almost every organ and system of organs in the body. True, the encephalic ganglia were found altered, either in quality or quantity, or both; the convolutions of the brain might be reduced to quadrumanous simplicity in one case, or present remarkable symmetricality in another; but these were conditions that could only be ascertained on post-mortem inspection. The question that presented itself to me was—Were there any outward and visible signs of inward mental disturbance? If idiocy were something more than brain alteration, it followed that an inquiry into the condition of the other organs might establish some correlative change in them. With this object in view, I made a careful investigation into the bodily condition of nearly a thousand feeble-minded youths—their height, weight, and bodily conformation; into the condition of their muscular development, the state of their eyes, the shape of their ears; and last, but not least, into the structure of their mouths and the contents of the oral cavity. It was in my inquiry into the condition of the teeth and mouth especially that I arrived at the conclusion that, in by far the larger number of instances, I was able to indicate the period at which the depressed condition commenced and to predicate in some degree the amount of improvement which physical, intellectual, and moral training might possibly effect.

Thus an examination of the mouth afforded me a valuable guide both as to diagnosis and prognosis in cases which, without such guide, would be surrounded with insurmountable difficulty.

In consultations one is often pressed by the friends of the patient for an opinion as to the date at which the affection commenced. It is always a relief if an opinion can be given that the child was born intelligent; that the calamity is the result of some after-birth catastrophe. Curiously enough, there is often a degree of wounded pride if it is decided that the child was defective from birth. It is by an appeal to the physical conformation only that the decision can be justly made. In children whose idiocy is accidental, arising from causes operating after uterine life, there is but slight deviation from normal condition in the state of the mouth and teeth; while it is in those whose malady is congenital, especially where arising from causes operating at a very early period of

embryonic life, that the deviation of the mouth and its appendages from the normal condition is most pronounced.

It often happens to me to see children, about whom the only anxiety is that they do not speak. The parents seek for an explanation in the condition of the palate, little suspecting that the palatal deformity is only one of the manifestations of a congenital mental defect, in which ideas are so little formulated that language is not needed.

I could occupy a large portion of the time of this meeting in illustrating the value of an appeal to the condition of the mouth as an aid to diagnosis in such cases; a few cases must suffice.

A year or two since a very intelligent medical practitioner in the country was called in to treat a case of infantile convulsions. The condition of the child was desperate. He poured from an ewer a stream of cold water over the occiput of the child; the convulsions ceased, the patient was rescued from impending death, but grew up to be an idiot. The friends of the child took up a position which involved a trial in a court of law, equivalent to an action for malpraxis against the medical man. By a judge's order, I, with other medical men, saw the child; and we were able to say not only that the child was an idiot then, but, by an examination of the mouth, to assert that the idiocy was embryonic as to date, that the convulsion was an epiphenomenon, and that the medical man was in no way responsible for the mental condition of the child whose life he had rescued. Thus, by an appeal to physical conformation, we were able to date the mental defect, and to save the reputation of a medical brother from undeserved opprobrium.

It will be within your remembrance that this town was some years since greatly moved by a sensational trial before a master in lunacy, in which an attempt was made to save from himself a youth with an honored name. "Liberty of the subject" was the popular cry, and after conflicting evidence, the popular will prevailed, and the free agent went rapidly to his doom. The counsel for the defence, in specious terms, suggested that the mistake about this young man's imbecility arose from a defect in his mouth, from which imperfect speech resulted. I showed at that time—too late, however, to influence the verdict—that that was the most important admission that could be made—that, given any amount of mental obli-

quity, no stronger confirmatory proof could have been adduced of his imbecility than the physical defects of mouth to which this lisping speech was due. The sequel proved the true nature of the case.

No less valuable, however, is a study of the condition of the mouth as a means of prognosis in any given case. In children who exhibit any want of mental power, or present anomalous moral or intellectual symptoms, no more anxious question is suggested than that relating to their probable future. The disposition of property, and other family arrangements, depend a good deal on the answer which is given. We have learned by experience this important fact, that the child who has been born with defective intellect is more susceptible of improvement by physical and intellectual training than the child who has been born with full possession of his brain-power, and has afterward lost it. It follows, that of two children who are the subjects of solicitude, other things being equal, there is greater probability of improvement for the patient with an ill-developed, than the one with a damaged brain. Often it happens that a microcephalic idiot, about whom the inexperienced would entertain no sort of hope, will far outshine, under intellectual training, the fine, well-developed boy the membranes of whose brain have been the subject of inflammatory lesion, and about whose capillaries lymph has been inextricably effused. An appeal to the condition of the mouth is an important aid in determining whether the lesion on which the mental weakness depends is of intra-uterine or of post-uterine origin. In the event of the mouth being abnormal, it indicates a congenital origin; while if the mouth be well formed, and the teeth in a healthy condition, it would lead to the opinion that the calamity had occurred subsequently to embryonic life.

Of course, our judgment would be formed after a physical examination of every organ—of the condition of the ears and eyes—of the shape of the cranium; but what I want to enforce is, that most important information is derived from an examination of the mouth.

I have had this day brought to me a young girl of manifestly defective power, and the parents were extremely anxious to know whether it was a congenital case. Their anxiety was based partly on an unwillingness for either branch of the

family to allow that there was on their side any hereditary tendency to mental disease—a sort of rivalry as to the purity of the two antecedent sources; but mainly also to ascertain with what degree of fear they must watch the development of their other children, and how it might affect the education of their sons, or the marriage prospects of their daughters. No study of the mental phenomena themselves would have enabled me to venture an opinion; but an examination into the totality of the physical conformation in general, and of the mouth in particular, enabled me to refer the calamity, with a considerable degree of certainty, to an accidental cause, probably a sunstroke in the tropics; to clear the other members of the family from the suspicion of insane proclivity, and to defend the purity of the rival stocks.

Let us now consider what are the conditions of the mouth associated with mental defect.

The lips are usually thick, the thickness being greatly more marked in the lower than in the upper one. In addition to the thickening, they are often striated, marked by transverse fissures; this character is more generally seen in a class of congenital idiots, which I have elsewhere described as Mongolian idiots, from their resemblance in physical character to the Mongolian race. Often the lips are deficient in muscular power, which interferes with their prehensile function, which also induces a tendency for the saliva to run over the chin. The mucous membrane is extremely liable to chronic inflammation, and ulceration is induced by the slightest pressure against prominent or uneven teeth. The glands of the mucous membrane of the mouth generally, as well as the salivary glands, are usually hypertrophied; and this is another factor in the production of stammering.

There is a marked postponement in the evolution of the first teeth. Looking over my notes of a very large number of cases, I find that the first dentition is almost invariably postponed. The ease with which dentition is effected varies; sometimes the teeth are cut so easily that no disturbance of the general health is observed; in others it is the period at which violent convulsive attacks are developed, imperilling greatly the feeble mental endowment of the child. Contrary to the law that tissues which are slowly formed are the most persistent, these primary teeth have a more temporary existence

than usual. They are frequently dark, speedily become carious, and their stunted growth often aggravated by the incessent grinding of the teeth, which is so frequent during the infantile life of such children. I have been curious to ascertain the cause of this grinding. In most cases it appears to be a kind of automatic movement, not depending on the direct influence of the will; one of those rhythmic movements of which there are several among children of this class. In others it would appear to be purposely developed to produce a monotonous sound, which imparts pleasure to the feeble-minded. Not only, however, are the primary teeth ill developed; they are often irregularly developed as to sequence. Nothing but disorder is noticed in their succession.

Just as the evolution of the temporary teeth is accompanied by cataclysmic effects, like phenomena not infrequently accompany the evolution of the permanent teeth. The epileptiform convulsions which accompany the first not infrequently after a long interlude, reappear at the cutting of the second, to be followed by another interlude, and a recurrence at puberty. I have now under my observation a boy whose first teething was marked by paroxysmal phenomena of the most violent kind, which ceased when the physiological effort was over. He has now arrived at the period of second dentition, and the evolution of every tooth is accompanied by well-marked epileptic attacks and by a corresponding decadence in his stunted mental development.

The evolution of the second teeth is also frequently postponed, and there is slight irregularity in the sequence of their development. A marked character of the teeth is their irregularity as to position. They are often crowded—so crowded as to present their sides instead of their anterior surfaces. They are often arranged on different planes. The canine teeth are frequently unduly prominent, and a marked sulcus is sometimes seen between the incisors and canines, with prominence of the incisors. The teeth themselves present very frequently a honeycombed appearance, from an absence of continuity in the enamel, and they undergo speedy decay. Nothing is more marked than the temporary nature of the so-called permanent teeth.

It has been a matter of considerable interest to me to ascertain how frequently the syphilitic teeth, so well described by

my friend and colleague Mr. Hutchinson, were to be met with among the feeble-minded; but the result of my inquiry has been to discover very few among them who were in this way indicated to be the subjects of congenital syphilis. Very few have had syphilitic teeth; but where I did discover them, I always had confirmatory evidence of the syphilitic history of the case, and the condition of the teeth was always associated with the chronic inflammation of the cornea to which Mr. Hutchinson has called attention. I have therefore been led to the conclusion that syphilis is not by any means an important factor in the production of congenital mental disease. The honeycombed teeth are, I am persuaded, perfectly distinct from the syphilitic, and are manifestations of that grave perversion of nutrition which implicates, in these cases, every tissue in the body.

The tongue presents peculiarities worthy of notice. It is frequently unusually large. Its inordinate size generally arises from increase in length, and also from an absence of muscular tonicity. The surface is often curiously corrugated, presenting numerous fissures. The surface is rendered still more rough from hypertrophy of the papillæ. Not only is the tongue inconveniently large, it is but feebly under the influence of the will. There is a want of co-ordination in its muscles; so that not only is the more intelligential act of speaking performed awkwardly even when there are ideas to be communicated, but the simple voluntary act of conveying the food to the posterior part of the mouth, where the reflex act of deglutition is excited, is effected with difficulty, and thus an almost instinctive act is rendered to some extent abortive.

Of most significant value, however, is the condition of the palate. I have made a very large number of careful measurements of the mouths of the congenitally feeble-minded and of intelligent persons of the same age, with the result of indicating, with some few exceptions, a markedly-diminished width between the posterior bicuspids of the two sides. The exceptions were some few cases of macrocephalic idiots, who had inordinately large crania, depending in some cases on hypertrophy of the brain, or more frequently on chronic hydrocephalus. In these exceptional cases the palates were as widely in excess, as in others they are less than the normal width. One result, or rather one accompaniment, of this nar-

rowing is the inordinate vaulting of the palate, which assumes a roof-like form. The vaulting is not simply apparent from the approximation of the teeth of the two sides, it is absolute —the line of junction between the palatal bones occupying a higher plane. Often there is an antero-posterior sulcus corresponding to the line of approximation of the two bones.

There is very frequently a deficiency in the posterior part of the hard palate, from a want of development of the palatal process of the maxillary bone, as well as absence of the palatal process of the palate bone. As a result of this defect, the false palate hangs down abnormally, and interferes with clear phonation. At an early period of my investigations I was prepared to find a large number of cases of cleft palate. This does not appear, however, to be a frequent defect—no more, according to my statistics, than 5 in 1,000 cases. Bisection of the uvula occurred 4 times in 1,000, and absence of the uvula twice. The cause of the frequent excessive vaulting of the palate is not quite clear; it may possibly arise, as has been suggested, from arrest of development of the sphenoid bone, or defective growth of the bone. It has been attributed by one writer to a cause which I think cannot be allowed, viz., sucking the thumb. This gentleman attributes idiocy entirely, or almost entirely, to "fruitless sucking." The chain of events, according to his theory, is this: The fruitless sucking gives rise to secretion of gastric juice in the stomach when it has no physiological use—that this acts as an irritant on the intestinal mucous membrane, giving rise to diarrhœa and disturbed nutrition, eventuating in convulsions and idiocy; and that the roofed palate I have described is the physical result of the pressure of the child's thumb against the palate. Banish fruitless sucking, he says, and idiocy would be unknown. I believe this to be a thoroughly mistaken notion. Idiots are not much more prone to fruitless sucking than other children, and I have examined the palates of several fruitless suckers among the sane without finding the palatal defects I have described. I think it will require no argument to prove that the defects I have referred to are developmental defects, and that they betoken a cause long anterior to the time when sucking the thumb is practised, unless that habit be an intra-uterine one. The theory overlooks the whole bearing of hereditary influence, and of nervous shocks and physical illness to the preg-

nant woman, as potent causes of imbecility in the offspring and negatives the idea of the congenital nature of the ailment.

There is one practical point with reference to the palatal defect which has some interest to me. One of the greatest difficulties we have, but one which, when overcome, brings the greatest *kudos*, is the teaching an idiot or imbecile to speak. We have to furnish him with a vocabulary, to practise him in tongue gymnastics, to build up for him a language, and to lessen the mutiny of the muscles of his tongue. When all this is in part accomplished, the arched roof of the palate is a great trouble. Imperfect speech still remains. Can nothing be done mechanically in this direction? Can the members of this society tell us of any success they have had by diminishing the palatal cavity among the sane that may augur hope for us with the insane? Often cases are met with where the palatal difficulty is just *the* hindrance to an improved imbecile mixing with the world, and taking his place with his fellows.

Among idiots and imbeciles there is often discovered a want of symmetry in the cranium. The plan which I adopt of taking the shape with a strip of lead shows this defect admirably, and enables me to sketch the precise deformity on paper. This want of symmetry also affects the bones of the jaw, leading to a great difference between the two halves of the maxillary bones. A very marked example of this kind was seen with me a short time since by my friend Mr. Ramsay, who advised the removal of some teeth to make room for the movements of the tongue. It was an excellent example also of the obtuseness to pain which is common among the feeble-minded. Often they are anxious to have their teeth extracted, as if it were a personal favor; they are flattered by the attention —rarely do they care for the pain which is inflicted—chloroform is for them a superfluity.

A want of symmetry is occasionally noticed in the palate when there is no very marked absence of symmetry elsewhere.

I might also mention anomalies of the tonsils and of the fauces, but these would have but little interest.

The gums are extremely prone to recede from the teeth, and to become tumid, as in the scorbutic condition.

The masticatory process is always performed with difficulty. The carious condition of the teeth is one cause of this, but it is principally due to the imperfection with which any voluntary

act is performed. The sense of taste is obtuse, no medicine, however nauseous, is refused, and without care many will eat with indifference the most offensive garbage.

To sum up, we have in the condition of the mouths of idiots important data for distinguishing between idiocy of a congenital and that of a non-congenital origin, and to base thereon a prognosis as to relative improvement by treatment. They are, the thickness of the lower lip, the delay of dentition, premature caries of the teeth, the irregularity of dentition, the chronic inflammation of the gums and buccal mucous membrane; the height, angularity, and want of symmetry of the palatal vault; the long, corrugated, and coarsely-papulated tongue, and the hypersecretion of saliva. Common to the congenital and non-congenital cases we meet with defect of mastication, a want of co-ordination of the muscles of the tongue, and the slight development of the faculty of speech.

I am anxious to hear from the members of this society their own experience with regard to any feeble-minded patients that may have come under their observation, and how far the picture I have drawn from nature contrasts with what they meet with in members of a sane community. It is quite possible that some of the characters I have noted may be met with sometimes among those who are doing their work in the world, and are among the bread-winners of society. My own experience leads me to consider that they are exceptional cases. May not palatal deformities be indicative of a slightly degenerative process? When investigating cretinism in the valleys of Piedmont, one is struck with the very gradual deterioration of the race. Some of the typical features of cretinism are met with among the grandparents, and we have been able to trace the increased degenerative stages through the children to the effete grandchildren.

I have often had a wish to measure and note the condition of the mouths of some of the progenitors of my patients, and trace—as I believe in some instances one could trace—the gradual deterioration of the species till it culminated in congenital imbecility.

That is just the link that I have not been able to forge. I know no men more likely than those I have the honor to address to-night, to be able to fill up, from their experience, the shortcomings of my own.

CHAPTER XVIII.

THE OBSTETRICAL ASPECTS OF IDIOCY.

If one regards the large number of children in our community who grow up with defective mental power, children who, although not all fairly to be ranked among decided idiots, yet have such lesion of the faculties of perception and reasoning as to bring them under the category of the feeble-minded, and if one has reference to the terrible anxieties such children entail on their parents, and the burden they often are to the struggling members of our race, one cannot fail to be impressed with the importance of anything connected with the circumstances of such a condition.

I had therefore no difficulty in responding to an invitation to bring before the Obstetrical Society some of the opinions which have been impressed upon me, having relation to facts which come under the immediate regard of gentlemen practising the obstetrical branch of our profession.

The data on which these remarks are based have been collected over a space of more than eighteen years, and relate to two thousand children who during that time have come under my observation, and about whom I have been able to gather information. They have been collected with great care and with an anxious desire to exclude all doubtful matter.

One very interesting and important point suggested by my inquiries is that of primogeniture. We know how much our political system hangs on the laws of primogeniture, how the first-born inherits property and inherits too the power to rule over his fellows, and how much our whole social structure is built thereon. Nevertheless, the result of my statistics shows that no less than 24 per cent of all the idiot children I have seen are primiparous offspring. How many primiparæ there are who, although not coming under the category of idiots are yet somewhat incapable, my statistics, of course, do not reveal.

It will be obvious, however, that before any real value can be assigned to this statement it will be necessary to inquire into the average number of children belonging to these families. This I have been at great pains to ascertain, and I find that up to the time I had been consulted in each case, 6.91, or nearly seven, was the average number of living children born to the parents who have had an idiot child. Fourteen per cent were second born, 9 per cent fourth, 5 per cent fifth, 7 per cent sixth, 10 per cent seventh, 2 per cent eight, 9 per cent ninth, 2 per cent tenth, 2 per cent eleventh, 1 per cent twelfth, 3 per cent thirteenth, and 1 per cent fourteenth. The question naturally presents itself as to what should give this undue preponderance of idiocy to primiparæ. I have no doubt that it may be largely attributed to the exalted emotional life of the mother; her life is one of exaggerated hopes and fears; she is prone to live in an unnaturally expectant atmosphere. She is going through an experience altogether new, with untried responsibilities both social and domestic. She is more than usually responsive to external impressions and influences, certainly more to subjective feelings and whims. But, as I have elsewhere observed, it would betoken a narrow view of the matter if we restricted our attention to the emotional life of the mother and kept out of sight the emotional tendencies of the father. No one who has seen much of private practice is unaware how much men are frequently influenced by the responsibilities of the matrimonial state, how the doubts as to their own virility, of their being able to make a position in the world after having given hostages to fortune, the disturbing elements of a new social position both with regard to their immediate circle of friends and to the new relationship formed. All these and some others are perturbing influences to many men, and while, therefore, the emotional life of the incubating mother is an important element, the emotional tendencies of the procreating father must be regarded too as a cause of the increased frequency of primiparous idiots.

But there is another cause which will naturally occur to the Fellows of this society as obstetricians. I refer to the increased difficulties of parturition. No one can have regard to the smallness of the maternal passages, to their undilated character, to the rigidity of the perineum, and to the tediousness of the labor, without being impressed with the influence

they must have in interfering with the integrity of the cranial contents and to their inducing a condition perilous to the future mental health of the little one. They are conditions which frequently give rise to instrumental interference, but above all to a state of suspended animation which in my opinion it should be the earnest desire of the obstetrician to avoid.

I think it cannot fail to strike the Fellows of the society as a very important fact that no fewer than 20 per cent of the idiots of my investigation were born with well-marked symptoms of suspended animation—symptoms which required judicious and strenuous efforts to overcome in order to effect resuscitation. Moreover, it is specially interesting that while, as we have said, 24 per cent of idiots generally are primiparous, as many as 40 per cent of resuscitated idiots come under this category. Clearly, then, suspended animation is a condition as far as possible to be avoided by the practical obstetrician.

Bearing on this part of the subject is the question of instrumental interference. I have made a careful inquiry on this subject over a very large area, and with the expectation I should find a large amount of idiocy to be the result of "meddlesome midwifery," but I am bound to say that my statistics falsify my anticipations, and redound to the care with which instruments are employed in parturition. I find from an examination of all my cases about which positive information could be obtained that in only 3 per cent were the forceps employed. In every case, however, where they had been employed the friends of the child believed that the instrument alone was the cause of the disaster, while in nearly every case I could discover quite sufficient to account for the mental defect in the neurotic history of the progenitors. In a very few cases, only a small fractional percentage, could I arrive at the conclusion that the use of the forceps was the principal cause of the calamity.

I find in a very large number of my cases that the labor was stated to be unusually tedious and prolonged. Dr. Playfair has shown that the employment of the forceps does not interfere with the viability of the offspring, and that a prolonged labor is more compromising to the life-prospects of the child than a judicious and timely application of the forceps. Cer-

tainly my statistics make clear to me, contrary to what some years since was advanced by Dr. Arthur Mitchell, and in harmony with Dr. Ramsbotham's experience, that the use of the forceps is not an important factor in the production of brain disease. When, however, it is borne in mind how frequent is the association of suspended animation with idiocy, it cannot, I think, be too strongly enforced that the mental integrity of the child is more likely to be compromised by a prolonged pressure in the maternal passages than by skilled employment of artificial assistance. The accoucheur who postpones instrumental help often does so at the risk of terrible consequences to the nervous system of the little one he is solicitous to protect.

I have collected a good deal of information as to the influence of twin births. There is a general prejudice that the individuals of twin births are not strong physically. Mr. Galton has been collecting materials on this and cognate subjects, but I am not aware of his results. Taking my last thousand cases, only 2 per cent were twins, while, singularly enough, the same thousand show that in 2 per cent of the cases the mothers had given birth to twins who were not afflicted in any way. This would appear to indicate that the existence of twins does exercise some prejudicial influence, seeing that among one thousand mothers who have borne an idiot child, where they have happened to be twins, no fewer than a quarter of them were idiots.

A very potential cause in the production of idiocy is the physical health of the mother during gestation. In 20 per cent of my cases there was a history of marked physical disturbance. In 4 per cent there was a history of serious falls —falls which were followed by alarming uterine hemorrhage. In 6 per cent there was an account of prolonged ill health, and in no fewer than 10 per cent was there a history of sickness—cases in which the vomiting had been marked and persistent, and had given rise to anxiety on account thereof. I feel quite sure that sickness during pregnancy is an important producer of idiocy and is a symptom which, from this grave aspect of it, claims the earliest attention of the obstetrician. It will be readily understood that any cause which would render the mother anæmic would be a source of peril to the mental health of the child.

From what I have already said it will have been gathered that I lay great stress on the emotional life of the child-bearing woman as a potential cause of idiocy. I cannot, however, attach greater importance to this aspect of the subject than it deserves. It is one of most serious importance and bespeaks one's careful regard. In no fewer than in 32 per cent of my cases was there a well-founded history of great physical disturbance in the mother by fright, intense anxiety, or great emotional excitement. They were all cases in which a strong impression had been made on the mind. In a large number of instances the fright was attended by syncope. They were cases of fright arising from threatened outrage to the person, or where they had seen their own children in great peril or killed, or where intense anxiety had existed in consequence of the fatal illness of their husband or the loss of several of their children. No doubt they were troubled in many cases which might have been borne with equanimity by a philosopher, but the mothers possibly were more than usually responsive, and with an unstable equilibrium required only the stimulus of fear or anxiety to exercise a morbid influence on the development of their children. No doubt the emotional tendency of the mother, as depending on the same neurosis, may be regarded as a cause, but the actively potential cause in all the cases I have referred to was mainly the undue response to some external impression. The lesson to be gathered from such data is a very important one, viz.. to maintain the child-bearing woman in the most equable state, to shield her as much as possible from all causes which would disturb unduly her emotional life, and to maintain in her that hopeful spirit and placid calm which is so much to be desired both for the woman herself as well as for the infant she is incubating. These data teach us how important it is that for women generally the emotions should not be cultivated at the sacrifice of their judgment and self-control.

The relation of sex to idiocy presents some matters of interest; there is a marked preponderance in the number of male over female idiots. The proportion among the two thousand I have noted stands in the ratio of 2.1 to 0.9, or rather more than twice as many male as female. It is, I think, a very fair conclusion to arrive at that one very important factor is the increased dimension of the male over the female infantile

cranium. This would be likely to give rise to prolonged and difficult parturition, to that continued pressure and that suspended animation which I regard as so disastrous to the cerebral functions. Another reason is the greater tendency, according to my notes, to infantile convulsions among males who have become idiots than among females who have become idiots, a circumstance which gives rise to a larger amount of what I call accidental idiocy among males. These statistics are, moreover, in harmony with what we know of the greater viability of female over male children. The question of sex opens up many interesting problems in relation to idiocy. I can only here intimate that where the origin is purely of a neurotic character my notes show that when the neurosis is paternal the male progeny are liable to suffer and the female to escape; where, on the contrary, the neurosis is maternal the female progeny are likely to bear the stress.

I have been at some pains to ascertain whether there is any relation between the administration of ergot of rye and idiocy. I have found, however, the answers so vague and the knowledge of my informants so uncertain that it has proved quite hopeless to arrive at any results which would have a scientific basis. Often the mothers have imagined that ergot had been used when there had been no such administration, and it is obvious that in many cases the medicine may have been taken without the mother being conscious that any drug had been made use of.

The diagnosis and prognosis of idiocy are both matters which perforce fall to the lot of the obstetrician, and it is of no small importance that he should have definite bases on which to form and give an opinion. An error in diagnosis would lead in all probability to unpleasant lessening of professional confidence.

The earliest observations, on the part of those in attendance on the child, of defect of sight, of unusual fretfulness or peculiarity as to taking food, should lead to very careful investigation of the structural formation of the child.

In cases which have a congenital origin you may find very early physical signs of serious trouble. The cranium must be examined as to its configuration, giving special heed to want of symmetry, to extreme dolicocephalism, to extreme brachycephalism, to rapid shelving at the occipital region, to the

condition of the sutures, their premature or deferred synostosis, and especially to the frontal region which often displays the medio-frontal suture still existing, whereas there should have been complete coalescence of the two halves of the frontal bone during intra-uterine life.

Examination of the ocular media and retina will remove the notion of blindness, and indicate that the defect in taking notice of external objects is rather one of cerebral than optical defect. The presence of strabismus should be noted, and the integument about the eye should be examined especially for semilunar folds of skin at the inner canthus—folds which are more frequently present in feeble-minded children than in others, and which I have been accustomed to describe as epicanthic folds. They are according to my experience marks of developmental degeneracy, and should be looked for. The position of the eyes is worthy of note, whether the inner canthi are too nearly approximated, as met with in microcephalic or scaphocephalic idiots, or too widely separated, as obtains in macrocephalic and hydrocephalic idiots. Observation should also be made as to any oblique position of the eyes as well as their wide separation, such as is met with in that ethnical variety which I have elsewhere described as Mongolian idiocy, a variety of great clinical as well as biological interest, showing that degenerative causes may and often do remove children into a different ethnic type from that of their progenitors. Particular observation should be made as to that peculiar oscillation of the balls called nystagmus, which is very frequently met with in children of the feeble-minded class.

The appearance of the external ear should be noticed, the condition of the pinna, the absence of a helix, and whether the lobule be absent. Observation should also be made as to the seat of implantation of the ear, which in idiots is usually placed farther back in relation to the head and face than in normal children. No feature is more worthy of regard than the configuration and position of the external ear.

The mouth should be examined as to its palate, whether it be arched or Gothic-shaped; the tongue, whether it be too large, rugous, fissured, and with its papillæ enlarged; the jaw, as to the angle formed by the ascending and horizontal rami, which in idiots is more obtuse than usual.

Examination should be made of the surface of the body as to the condition of the skin—noting whether it has a lax and soddened appearance, especially on the extremities, and whether there be any defective coalescence at the bottom of the spine. The muscular system should be examined, special observation being made as to the existence of any automatic movements, contractures, or spastic rigidity. In early childhood as well as in more advanced life too much attention cannot be given to these physical signs of cerebral disease. They are, many of them, the marks of that kind of idiocy which is inherited or congenital in its origin, of that kind which is so often met with as the outcome of a gradually-degenerating race.

Idiocy, however, is not always strictly congenital; in a large number of cases it is acquired or accidental. This includes those cases which occur from inflammation, often of a slow and insidious character, of the meninges whereby products are thrown out which afterward interfere with the nutritive supply to the encephalon. It includes also the recoveries, although very rare, from tubercular meningitis, from infantile convulsions, and from acute diseases of various kinds, also those arising from traumatic injury as well as those where narcotics have been injudiciously and probably furtively given.

It is of great importance to be able to differentiate these accidental cases from the congenital ones, and this can only be done by having regard to the physical diagnosis I have before referred to. Often the friends of the children refer the origin of the disaster to a careless nurse who has let the child fall, to some remembered fright, or to an accoucheur who has used instruments unadvisedly; but a reference to the physical condition of the child may tell one that the cause was long antecedent to the one suggested, and that far back in intra-uterine life, or possibly before, in the history of the progenitors, must the real cause be traced.

Not only is physical examination important in a diagnostic point of view; it is of no less value, as we shall see, in prognosis. What is to be the future of our child? is a question which will be put with more or less earnestness, usually with an earnestness from which there is no escape, and the reply will be treasured for years to come. I find that a large number of replies are given, apparently based on some sort of

belief in periodic leaps. The favorite epoch is seven years. The friends are often lulled into a false security under the notion that at seven, fourteen, or twenty-one years of age all will come right. I know nothing of such cataclysmal improvements. The misfortune is that such opinions prevent all active means being employed, and when the longed-for time arrives it is found that precious opportunities have been lost, that with increased physical development there has come a stronger will, more resolute disobedience, and an absence of intellectual and moral growth which proper training might have effected.

But a no less fallacious opinion is often based on the good looks of the patient. The child probably does not speak at the proper time, rolls its head in a rhythmical way, looks into space, or makes monotonous noises with its lips. "Oh!" it is often said, "have no anxiety, all will come right; he is so bright-looking, so comely, he has no deformity of head, no lesion of limb." The friends have no difficulty in falling in with such a doctrine, and they await in full reliance the future which is predicated, but it is a future which never comes. It is experience alone that tells one that the prognosis in such a case is far less hopeful than in the case of one whose misplaced eyes, ill-shaped cranium, and distorted face gives ready indication of his feeble mind.

The case we have been considering is one of accidental origin. Something since birth has given rise to the disaster and has left no trace on his exterior. With such an one we are able to predict much less response to training than in the case of one whose defects have had an origin anterior to birth. It may be taken as a rule which has but few exceptions, that congenital idiocy is more amenable to training than post-congenital, that, in fact, it is more hopeful to have to do with an ill-developed than with a damaged brain, and having regard to what I have laid down as to the physical signs and configuration of congenital idiocy, that the prognosis is, contrary to what is so often thought, inversely as the child is comely, fair to look upon, and winsome.

It will be readily conceived how many interesting points of departure are suggested by the topics I have touched on. I have endeavored, however, not to wander into simply philosophical paths, but to confine myself to what I considered had most direct bearing on "the obstetrical aspect of idiocy."

CURE OF THE

MORPHIA HABIT.

BY

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CURE OF THE MORPHIA HABIT.

CHAPTER I.

My chief object in writing the following pages has been to compile a guide for the use of my own patients: so as to give them an idea of what is required to escape from the thraldom of morphia.

Those who have never before attempted, and failed, to wean themselves from the fatal stimulant, will perhaps think the conditions laid down tiresomely and disagreeably exacting, clashing and interfering, as they do, with all their habits and impulses. There are some, however, who have hitherto been unsuccessful only for want of proper direction, but whose constant hope by day, and dream by night, is to recover their liberty. They have been treating themselves unwisely, but under the impression that they were doing all they could. These will be only too glad to comply with the conditions, and consider recovery cheap at the cost of such compliance.

Those who might be disposed to consider their cases as utterly beyond hope may be told that instances of recovery are upon record after an addiction of twenty years, and even when the limbs have been distended to twice their size with dropsical fluid. I have on the other hand seen recovery in a case of twelve years' standing, where the body was covered with wounds resulting from abscesses, and where the patient was in so extreme a degree of emaciation that his friends never expected to see him leave the establishment where he went to be treated.

But if we are prepared to preach hope to every one addicted to morphine who is not compelled to the practice by some painful and incurable disease, the conviction of the possibility of ultimate recovery should not encourage those who are as

yet but on the threshold to push any further into this realm of moral darkness. Although it is quite true that in some cases and for a short period of time, the absorption of a certain quantity of morphia is followed by a vital and intellectual exuberance, the daily euphoria is succeeded, even at the beginning, by a period of depression, and often of irritability, which affords an indication as to the kind of price that will have to be paid for the indulgence later. And again, although some *habitués* may go for long years without being apparently any the worse for the habit, in other cases the condition known as morphinism quickly supervenes, and the patient soon breaks down, physically, mentally, or morally.

Those who are taking morphia in ignorance of its danger, or under the impression that they are justified by some loose medical prescription in so doing, should remember that the habit is a most insidious one, and if they want to know exactly how they stand, they have only to attempt to do without it. Should any discomfort be experienced from its cessation, the practice must be given up at once, for if there is not already addiction, it is dangerously threatening.

I have restricted myself in the following pages to the question of treatment, and have therefore been obliged to leave many interesting points, more particularly that of its social consequences, untouched. Much as I should have liked to discuss this topic, I could not do so without exceeding my intended limits. Novel, moreover, and even startling as my experience would appear to those who are practically unacquainted with the subject, it would be impossible to allude to certain facts and episodes—without referring to persons too well known in society—for such allusions, however closely veiled, not to be more or less transparent, and to a certain degree, therefore, a violation of professional secrecy.

I think it was Montaigne who, notwithstanding his general disbelief in medicine, advised the sick to bestow their confidence upon those who have suffered in the same way as themselves. In accordance with this idea then, I have only to add, in recommendation of the plan set forth in this little volume: *Experto crede.*

Some years since, I contributed a paper to the "Lancet" ("On the Relief of the Morphia Craving by Sparteine and Nitroglycerin." The "Lancet," 27th June, 1887), on the relief of

the morphia craving by sparteine and trinitrin, demonstrating that the heart failure, which is one of the chief factors of the craving, can be practically relieved by these agents in the same way as it is by the hypodermic injection of morphia.

The demonstration did not repose upon the statements of patients, which, always biassed in questions of the kind, are more than usually fallacious when they emanate from a morphia *habitué*, and concern his treatment. It was the result of a long and careful study of the pulse, by means of the sphygmograph, undertaken conjointly with my old teacher

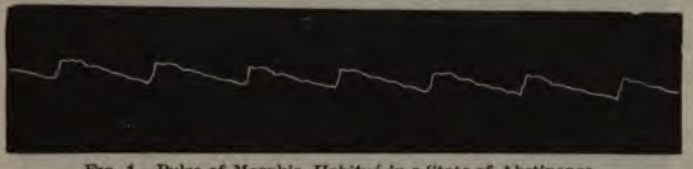

FIG. 1.—Pulse of Morphia *Habitué* in a State of Abstinence.

Prof. Ball, and which had already formed the subject of several communications to different scientific societies. ("Des Modifications du Pouls dans la Morphinomanie," par MM. B. Ball et O. Jennings. "Comptes rendus de l'Académie des Sciences," 1887. "Considérations sur le Traitement de la Morphinomanie," par MM. B. Ball et O. Jennings. "Bulletin de l'Académie de Médecine," 1887.)

We had shown that the pulse of a morphia *habitué* in a state of privation presents a peculiar plateau, which is well seen in the above tracing, caused by a want of cardiac impulsion, together with a resistance to the passage of the blood in the vessels. A hypodermic injection of morphia given at this moment re-establishes the normal state of the circulation, as is shown in the second tracing, taken from the same patient as the first, at the interval of a few minutes:

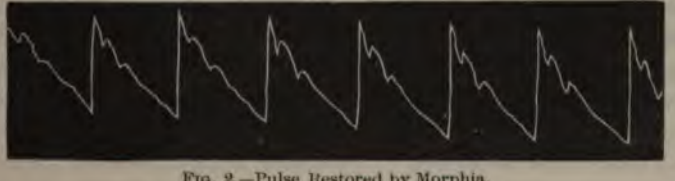

FIG. 2.—Pulse Restored by Morphia.

The study of these tracings suggested the use of cardiac tonics and stimulants as substitutes for the morphia during

the progressive reduction, and we tried different agents of the kind, deciding finally upon sparteine, on account of the facilities it offers for hypodermic injection, and consequently of producing a rapid and evident effect; upon trinitrin, because of its congestive effect upon the head, and its calorific influence upon the body generally. The following tracings show the restoration of the pulse by these medicines:

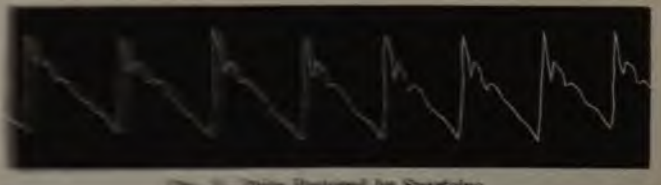

Fig. 3.—Pulse Restored by Sparteine.

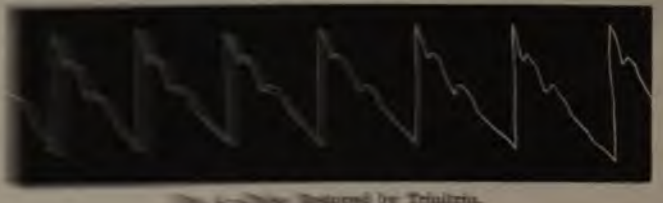

Fig. 4.—Pulse Restored by Trinitrin.

These observations have since been indorsed by a number of physicians, to whose testimony I shall presently refer, and I was not acquainted with any published opinions to the contrary. One American specialist only, whose competence in the matter is unquestionable, Dr. Mattison, of Brooklyn, assured me verbally that he had been totally disappointed with the effect of the remedies.

Whether he has since modified his opinion or not, I do not know, but I found that the difference of opinion was caused by a misapprehension of what I had meant. Unacquainted with French, Dr. Mattison had only read my paper in the "Lancet," which was but the sequel to a much fuller essay on the subject, previously contributed to the "Encéphale" ("Sur un nouveau Mode de Traitement de la Morphinomanie," "Encéphale," 1881), and reprinted afterward with additions. He had understood that I had intended to propose sparteine and trinitrin as substitutes for morphia, and he had attempted to stop the morphia suddenly, and give them in its place. If he had read my first paper, he would have understood that my plan of

treatment consists of a gradual tapering-down of the morphia hypodermically, and the administration, after a certain point has been reached, of increasing compensatory doses by the mouth or rectum. It is only at the end of the treatment that the use of these medicines will take the place of morphia. Hence the plan adopted by him of cutting off the morphia suddenly, and replacing it by sparteine and trinitrin, is entirely opposed to what I advocate. Sparteine and trinitrin are not substitutes for morphia, and will not take its place as long as a vital necessity for it remains, but when the weaning is almost complete they relieve the morbid craving, which is the only remaining obstacle to success, to a sufficient degree to enable the patient earnestly desirous of giving up the habit to carry the treatment to a successful issue.

Notwithstanding the relief afforded by these medicines, I may say at once that the majority of morphia *habitués* who apply for treatment do not by their aid renounce the use of the drug, for the simple reason that they are not in earnest, but this is no proof whatever that they might not have done so, had they so willed. No dependence whatever can be placed upon the statements of morphia patients, and the affirmation that a substitute for morphia procures them no relief is most often a mere excuse for returning to the old drug. I am now in possession of sufficient evidence of the efficacy of my plan, and of sufficient proofs, and even confessions, that it has been no imperious craving, but a mere morbid impulse that has prompted those patients who have failed under my care to relapse, that I do not hesitate to affirm that the morphia habit may be given up without positive suffering, provided the patient will allow himself to be protected against temptation; and when he gives himself up to competent guidance, the amount of restlessness and discomfort is reduced to that experienced upon the cessation of any other stimulant.

For all this, the cure is not an easy one, for it requires on the part of the wayward patient the unswerving determination to submit to guidance in a host of little details, and on the part of the medical attendant the greatest tact and sympathy, as well as special knowledge.

Although the plan of treatment I now follow is identical in principle with that which I described in the "Lancet," three years' further experience of morphia cases has caused me to

modify my practice in different particulars. But before developing my present method, it will be as well to bring forward some evidence in favor of the original principle of treatment, as first set forth.

Two important works on morphinomania have appeared since my last publication. I might have said three, and included Erlenmeyer's "Die Morphiumsucht," but it is evident that Erlenmeyer had not read my most recent paper when preparing his work. In his bibliographical index, a short note of mine of no importance, written in 1878, is carefully quoted, whereas the series of papers which preceded the publication of his volume by only a year evidently came too late to be taken into consideration.

The two works to which I refer are (1) the second edition of Professor Ball's "Leçons sur la Morphinomanie," a masterpiece of clinical teaching; (2) Dr. G. Pichon's important "Traité du Morphinisme" (Dr. G. Pichon, "Du Morphinisme." Paris, O. Doin, 1890), the most voluminous work on the subject in the French language.

Prof. Ball says nothing about trinitrin, but the treatment advocated in his book, and illustrated by cases, is that of the gradual substitution, under restraint, of hypodermic injections of sparteine for those of morphine. Neither the treatment, nor the conditions under which it is carried out, coincide precisely with my programme, but it is essential to remember that heart tonics are the chief therapeutic treatment advocated.

Dr. Pichon expresses himself as follows: "The pulse of the morphia *habitué* does not afford to the finger any important indication . . . but there is a registering apparatus, the sphygmograph, which compensates for this insufficiency as regards delicacy of touch, and which analyzes the slightest arterial anomalies. It is in this manner that the experiments to which we refer, and which we had the good fortune of witnessing, were made. . . . These researches were made by Dr. O. Jennings, attached to the laboratory of Prof. Ball, upon the numerous morphia *habitués* who were attending the clinique at the time. . . . Before arriving at a definite result, Dr. Jennings took a series of tracings from patients in different stages of morphinism—state of want, state of satisfaction, intermediary condition, normal condition." Dr. Pichon then gives the con-

clusions of the communication presented by Prof. Ball and myself at the Academy of Medicine, and adds: "Nous avons contrôlé à plusieurs reprises ces savantes recherches. Nous avons pris un très grand nombre de tracés, et nous sommes arrivé aux mêmes résultats." He then points out that the sphygmographic examination of the pulse is, as I have always taught, the best way of telling whether a patient is honest or not in carrying out the prescribed reduction. If the plateau is not obtained, when the patient ought to be in a state of want, there need be no hesitation—he takes morphia secretly. "This discovery has been the pivot," he continues, "of the physiological treatment, which appears to have given" (as we shall see at the end of the chapter) "very good results." "After numerous trials, Dr. O. Jennings found that the sphygmographic tracings, after the use of sparteine and trinitrin, gave the same results as an injection of morphine. The problem was solved physiologically and clinically. It (the treatment) often gave before us excellent results. . . . Most interesting practical consequences result from these physiological discoveries, both as regards diagnosis and treatment." Further on, after passing in review the different treatments that have been advocated, Dr. Pichon concludes: "We should prefer the physiological treatment of Jennings, based upon the action of sparteine and trinitrin. . . . We have seen that these two therapeutic agents replace absolutely the circulatory action of the morphinic euphoria, and overcome the state of want by causing the disappearance of the plateau." Details of cases treated with success by sparteine complete the chapter.

The evidence in favor of trinitrin is no less conclusive. Dr. Mitchell, of Philadelphia, writes as follows: "I may allow myself, having this opportunity of writing to you, to say that your essay, "De la Morphinomanie," has been on several occasions most useful to me, and the treatment by the use of trinitrin assisted me very greatly in two or three cases of morphinism that I have lately had the misfortune to see."

A French physician, whose name I am not at liberty to mention, for obvious reasons, writes to admit that he has modified his opinion, which was at first unfavorable in consequence of his having swallowed the tablets instead of slowly sucking them. "Scientific probity," says the writer, "being the first quality of the experimenter, allow me to inform you

that the trial of the trinitrin tablets, according to the *modus faciendi* advised by you yesterday, has indeed been followed by the effects you anticipated—a feeling of warmth, most sensible on the face, but extending through the whole of the body. It is true, quite true!"

Although I look as a rule with considerable suspicion upon the enthusiasms of morphia patients, I cannot refrain from quoting one letter out of the many documents of the kind that I have received about trinitrin:

"Although I have passed a hard day," says the writer, a young lady, "I have adhered strictly to your orders. I went out this morning, and when I came home had an awful *crise*, but determined not to touch the morphia until four P.M. I thought of the trinitrin which I took (three tabloids), and so immense was the relief afforded, that I feel there is nothing so useful as a substitute for morphia. Although I have not yet taken my second dose to-day, I am so relieved that I am able to write this letter to you, and to read and amuse myself with comparative comfort. I tried the tabloids, I must admit, without much faith, and was amazed at their effect. I think I shall do well until over Tuesday, when I will send or call on you, but I feel that I must tell you at once the splendid effect of the trinitrin." When this letter was written the patient was advancing rapidly toward cachexia, taking morphia without measure, in the intervals of her fits of remorse, when she would place herself under medical direction. I estimate that her daily ration of morphia was between six and eight grains. At her own suggestion a double solution was made containing morphia and sparteine, and this was commenced at a time when she had managed to decrease to two grains. Since then she has kept at about that amount, and now presents the appearance of perfect health.

I have said that in writing these pages it is not my intention to offer a systematic treatise upon the morphia habit, its causes and consequences, but simply to make known in all its details a plan of treatment that I have found successful as often as the patients have placed themselves unreservedly in my hands, and observed loyally all the necessary conditions. Although I have some hope that this little pamphlet may be of service to my fellow-practitioners, its primary purpose is to give my own patients a full explanation of the method upon

which we are working, and a complete programme of what I take to be conditions of success.

A certain number of morphia *habitués* are argumentative, and fond of excusing their frequent infractions of obedience by declaring that something was said which had authorized them in so doing. Being, moreover, of bad faith themselves, the verbal utterances and warnings of their medical advisers are accepted by them as specious and plausible sophisms, which they may not be able to combat, but to which they do not feel obliged to give implicit credit. By writing and printing this kind of code, the patients to whom I allude will see that what I tell them is not invented on the spur of the moment to meet the exigencies of their particular cases, but that all my recommendations are part and parcel of a regular plan of treatment.

It is no part of my task to enter into the symptoms of chronic morphia poisoning; but, as my treatment is based upon a certain conception of the nature of the morphia craving, it will be as well to give at once my theory of its mechanism.

I suppose that the want of special stimulation, felt as the morphia craving-yearning, reduces itself physiologially to the requirement of a peculiar mode of molecular motion. The condition of ordinary *ennui* which has been described as "a sense of tedium in inactivity," having its source in a want of mental occupation, or, in other words, the want of molecular change in certain cerebral centres, is intensified into the distress that results from "the representation of a future in which such cravings will never be satisfied." This "dissatisfaction," by inaction of the nervous system, is associated with the ento-peripheral craving resulting from the diminished impulse to those organs, and more especially the heart, which subserve nerve activity. Each recurrence of the sensation is probably heightened by auto-suggestion of the means of satisfaction, and by the abeyance of the controlling power of the will over the morbid automatism of the lower centres, which are polarized, as it were, into fixed yearning for the accustomed stimulant. From this tendency to an accustomed molecular motion on the one hand, and the enforced inaction from want of the necessary stimulant on the other, arises a condition of cellular unrest and fatigue, which has its exact counterpart in the external habitus of the patient.

The feeling of intimate restlessness is accompanied by an impossibility for the individual to remain at repose; but if he seek shelter by walking about, he is soon forced by fatigue to sit or lie down on a couch or easy-chair, when no sooner has a suitable position been discovered, than the renewed restlessness compels him to be up and moving.

It is this imperious tendency to movement which shows itself also in involuntary startings, etc., that furnishes one of the chief indications of treatment. Energy resulting from the accustomed pharmacodynamic stimulus is required to give full satisfaction to the morphia *habitué*, but motion in all its modes is a sedative to the craving, providing always that it be not carried to fatigue.

Starting from this point, I treated my first case by the application of different physical stimulations, such as faradization, massage, dry friction, heat, galvanism, etc., toward the end of the progressive reduction, and I found that I was able to effect sufficient breaks in the monotony of the yearning to enable the patient to wait for his decreasing doses with patience. What is generally so profoundly discouraging to a morphia patient is the certainty that once the craving is felt, it will go on with increasing distress until the morphia is administered. In the case I allude to, as the doses became less frequent and less considerable, the periods of relative comfort became, as is always the case, shorter and shorter, and a strong desire for the morphia was felt hours before the time appointed for the injection. Although other medicines had been taken in the course of the reduction, at the time the physical stimulation plan was tried, the only drugs used were bromide, valerianate of ammonia, and bicarbonate of soda. The result of the experiment was entirely successful. The patient who had taken morphia for five years, and cocaine for a year and a half, latterly in doses of over twenty grains a day of each, and who had failed, moreover, previously on two occasions on the very brink of success, managed to come triumphantly through the ordeal. Besides the different stimulations and medicines mentioned, he also made great use of the hammock, in which he would lie exposing his limbs for hours together to the broiling sun.

It was upon this theory of the substitution of another stimulus to the brain cells for the accustomed one that I was led

to use trinitrin, and afterward nitrite of amyl. Although these agents have a powerful action on the heart, it was not on this account that I selected them, and, indeed, if a medicine could be found exercising a similar action upon the blood-vessels, without stimulating the heart, it would be preferable. What the heart requires is a tonic rather than a stimulant, the action of which is always followed by a corresponding depression.

The second indication of treatment is to be found in the state of the heart which participates in the general vital stoppage, giving rise, by its sluggish action, to some of the most distressing symptoms. The sphygmographic tracings, given above, make this very clear; and, although the plateau of morphia abstinence is not especial to this condition, being met with in other phychoses such as melancholia, neurasthenia, hysteria, and dipsomania, it is in a morphia case, as, indeed in the others mentioned, proof positive of the necessity of a heart tonic. Some physicians, more particularly those who have never used it, are sceptical as to the value of the sphygmograph; but I am sure that it has often afforded me indications for treatment which would otherwise have escaped me. In dipsomania, the unhappy subjects are too often supposed to resort to drink, in consequence of a mere morbid impulse, but if the sphygmograph were used, it would often be found that the impulse has a physical basis in the shape of heart failure, and that the "sinking" feeling pleaded in extenuation is not a pretext only.

The following tracing, which affords a good example of

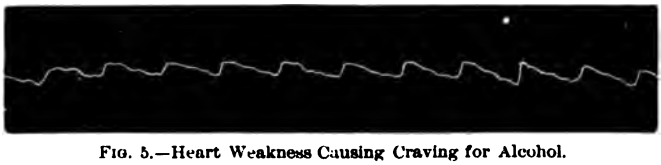

FIG. 5.—Heart Weakness Causing Craving for Alcohol.

this condition, was taken from a lady whose menstrual period was generally associated with a fit of drinking. She was brought to me, after the failure of numerous treatments, in the hope that I would counsel her confinement in a "home." The tracing suggested the trial of a heart tonic, and I advised a mixture of coca, hydrastis canadensis, and digitalis, and,

of course, total abstinence. Eight months have elapsed; and, although on two occasions (for an ulcerated sore throat, and for bronchitis, following influenza) port wine was given, and the bottle allowed experimentally to remain at her discretion, there has been no relapse. Such a result would be satisfactory in ordinary alcoholism; in dipsomania, it is remarkable.

Another lady, whose complaint has been variously designated under the names of hysteria, neurasthenia, hypochondriasis, monomania with fixed idea, and whose chief symptom consists of feeling and thinking herself ill, and, in fact, of being ill, shows a similar tracing.

Here, however, there is no malaise about the heart, but one can quite understand how an insufficient circulation of blood may give rise to a constant "dissatisfaction of the ner-

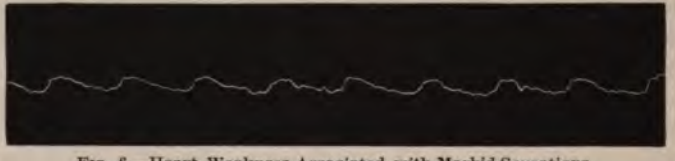

FIG. 6.—Heart Weakness Associated with Morbid Sensations.

vous centres," and hence to a craving for sympathy and relief, too readily put down to morbid fancy.

In a case of morphia habit, the plateau affords, then, not only the best evidence of suffering, but it also indicates the means of relief. The necessity of promoting a healthy function of all the other organs, although less evident, is scarcely less important. Just as in disease of the liver, or kidneys, secondary difficulties may arise in the lungs or heart, so the overtaxing of the digestive organs may upset the restored balance, and render the treatment ineffective. Hence the necessity for the *habitué* to allow himself to be directed, even in the most trifling details.

To sum up, the want of morphia makes itself felt chiefly in two directions—(1) a condition of restlessness, and sometimes of pain, depending upon the want of an artificial stimulus to the brain cells, which has become, as it were, so indispensable to function that it almost represents vital force; (2) by a failure of the heart's action and a sluggishness of the circulation, caused by the want of the natural nervous influx

to the heart, and also by the lessening of the *vis a fronte* through the suspension of the chemico-vital processes in the tissues. Given at the proper time, trinitrin and nitrite of amyl will relieve the one, and sparteine or any other suitable heart tonic will prevent the other to a sufficient extent to render any one of moderate firmness able to resist the craving. But for the cure of the morphia habit something more is necessary. It requires that for a sufficient space of time the patient be protected from the temptation which exists as long as he is not cured, of exceeding in morphia, not because there is any really painful craving for it, but on account of the irresistible impulse that prompts even the best intentioned to succumb to its fascination. It requires that during a certain time he so order his life, that the decreasing doses of morphia suffice to prevent discomfort, an end that will not be attained if the patient commit any indiscretion in the shape of errors of diet or over-fatigue, etc.

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Thanks to sparteine the habit had been overcome without much difficulty (although under restraint) and the patient, supposed to be out of danger, had left off the heart tonic a few days previously. Curiously enough, I had myself taken some tracings of the pulse a few months before, and had been alarmed at the effect upon the circulation of a small dose of trinitrin. The amount given, two drops of a one-per-cent solution, had lowered the tension to an extreme degree (see Fig. 7), and in relating the case (the "Lancet," June, 1887), I wrote: "The hyperdicrotism made me feel a little uneasy, although the patient, who had been in a state of restlessness

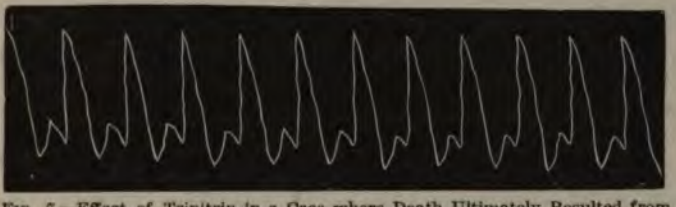

Fig. 7.—Effect of Trinitrin in a Case where Death Ultimately Resulted from Cardiac Failure

and enervation, was quite comfortable, and became quite cheerful." Subsequent events showed that my uneasiness was not unfounded.

The following tracings are those of a woman who had been temporarily broken of the habit, thanks to sparteine, but under restraint. Six weeks after the cessation of the treatment, I took her pulse with a view to ascertain whether

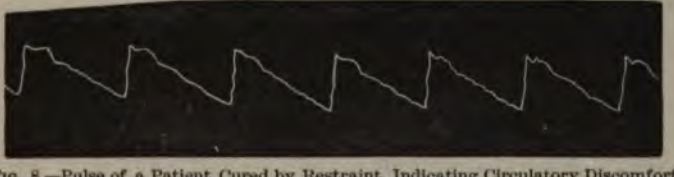

Fig. 8.—Pulse of a Patient Cured by Restraint, Indicating Circulatory Discomfort and the Necessity of a Heart Tonic.

the habit had left any permanent injury of the vascular tonicity. The tracing indicated that the circulation was unsatisfactory, and the patient told me that she felt uncomfortable about the heart, and would certainly be obliged to resort to morphia when she recovered her liberty, unless she could

brace herself up by sparteine. I suggested that she should try trinitrin instead, and placed successively four drops of the one-per-cent solution on her tongue. Five minutes afterward she felt much more composed, and the pulse showed an

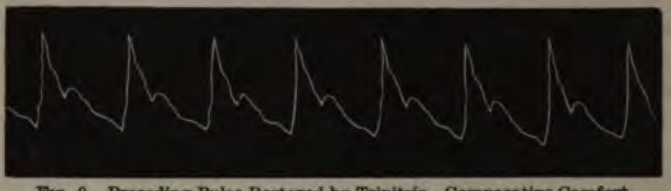

Fig. 9.—Preceding Pulse Restored by Trinitrin—Comparative Comfort.

improvement. She still maintained, however, that something more was needed to keep her away from morphia, so I injected two centigrammes of sparteine with the effect seen in the tracing, the patient expressing herself perfectly satisfied.

It would be equally unsafe to suppress morphia in a case of valvular disease, and it is scarcely worth while making an attempt in most incurable painful affections. I was consulted

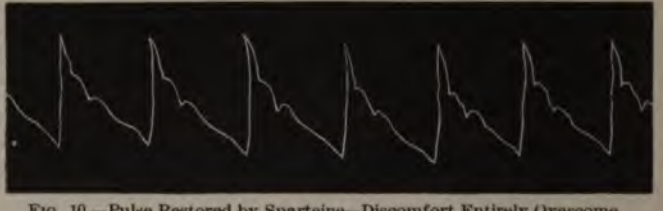

Fig. 10.—Pulse Restored by Sparteine—Discomfort Entirely Overcome.

by a judge who, notwithstanding the short duration of the habit (three years) and the moderate amount of morphia taken (three grains), was already in an advanced state of cachexia. In his own opinion he was suffering from rheumatism, but in reality his malady was locomotor ataxy. After decreasing a little he had such a terrible attack of pain that he was obliged to return to the original amount. He wrote to me to excuse his weakness, saying that he had not sufficient strength of mind to go on, but that he was ashamed to come and tell me so himself. As a matter of fact, however, he had only given way when his sufferings were past endurance, and it was certainly better to return to morphia than to commit suicide, as I have known a patient similarly situated to do.

Supposing, however, that the candidate for treatment presents no bar to recovery, the first condition of success is that he be earnestly and personally desirous of escaping from the thraldom.

I have very little confidence in those who have only yielded to the pressure of friends or parents. Not only do they lack the first condition, but they generally make a difficulty about the second, which is to place themselves unreservedly in the hands of their medical attendants, with the understanding that they are to exact nothing and to do nothing during the course of the treatment that has not been prescribed or agreed upon. With one single exception, I have never seen a good result from treatments left in the patients' own hands.

This leads to the question of restraint. Most specialists, especially in Germany and France, are advocates of it, and for my own part I should not hesitate to recommend this measure in some exceptional cases. I should never do so, however, unless thoroughly convinced that the previous treatment had been directed by some one really competent in the matter. I have heard some otherwise sensible physicians declare that the morphia habit was mere perversity, and that the patient can throw away syringe and solution if he only choose to make a firm resolution; others are equally dogmatical in declaring it entirely incurable, and in maintaining that any time and trouble expended in this direction are entirely thrown away. It is scarcely necessary to say that I should not take into account any previous treatment carried out under such auspices.

The chief reason against restraint, to my mind, is that our real aim is not so much the temporary suppression of the morphia, as the cure of the desire for it, and the best way of effecting this is by the re-education of the dormant will.

The patient should, however, I think, as a rule, remove himself from the medium in which he has been accustomed to play the tyrant, and submit with resignation to be rationed and supervised; but he should have the power of putting an end to his privation at any moment. I advise him to submit, not to restraint, but to restriction. He is to do what he will, but while under treatment he is to render an account of what he does.

Besides the reason given against asylums, there is another

of greater cogency, which is that confinement seldom secures even the immediate end in view. A morphia *habitué* may, with proper guidance, give up his habit of his own free will, but so strange is his mental constitution, that after he has consented, or perhaps begged, to be placed under restraint, he will, if his request is acceded to, at once endeavor to render restraint unavailing. He is an hysterical subject, whose proper feeling may be aroused and restored, but with whom coercion only develops the morbid symptoms in a higher degree. If he could be watched in an asylum, like a condemned prisoner suspected of wishing to commit suicide, no doubt the suppression might always be obtained; but even those who are constantly in contact with morphinists hesitate to insist upon a too rigorous surveillance with patients who voluntarily place themselves under treatment, and who can say very plausibly that they would not have been likely to give up their liberty had they not the strongest possible intention of getting well. For all that, I have seen only two patients cured in asylums, and they both relapsed within a few days of leaving the establishment, while I have had to do with a dozen deceivers at least, who are reported in the statistics of various places as having "left cured, but relapsed after a short time," while, as a matter of fact, they had supplies of morphia all the time.

In sanatoria and "homes," whether with restraint or not, there are, as a rule, too many people under treatment to allow of individual attention, and this association seldom brings about an emulation for good. A patient whose analysis of her own case is to be found in a former essay, says: "I cannot conclude these notes without declaring that, to unite all the chances of curing a morphia *habitué*, we ought as far as possible to separate him from those suffering in the same manner. I have learned at my own expense the wisdom of this measure." Such is also my opinion, for I have known several patients in special institutions tempted back into morphia by their perverted associates, just as they were on the brink of success, and this even in a model institution like Schöneberg.

I have dwelt at some length upon this question of surroundings, because the success of the treatment depends entirely upon making a good beginning. It is of no use to com-

mence under unfavorable circumstances, in the belief that the beginning being comparatively easy, it will be time enough to look about for a suitable place as soon as the reduction becomes irksome. To succeed, the necessary conditions must be observed from the very first, and no secondary considerations allowed to hinder them. If the patient's means do not allow of carrying out the programme, that is another thing, but no deviation from it should be tolerated for mere convenience, or for unnecessary economy. Two courses then remain open—treatment at home, and treatment in a special establishment. If treated in his own house, he must consent to remain a prisoner in it, going out in the company of a reliable person, and not receiving any letters or parcels that have not been opened in the presence of his attendants. A change of surroundings, however, is preferable, as morphia *habitués* are generally far more reasonable with strangers than with members of their own family, whom they tyrannize from force of habit. The difficulty is to find a suitable "home" where only a few patients of the kind are taken, and the fewer the better.

An excellent retreat for this purpose in Paris is the Maison de Santé of the Frères St. Jean de Dieu, where most of my male patients have been treated. The house is open from 6 A.M. to 9 P.M., and every one is free to come and go; but I always exact a solemn promise that, until the treatment is ended or abandoned, the patient will not go outside the door. It is, of course, advantageous to be under medical supervision, but some of the Brothers here have had so much experience, that they know as well as most medical men how to conduct a treatment of the kind. Another place where they have their heart in their work is the Levick Home, and there also they are so thoroughly in earnest that very little medical intervention is required. The most inveterate case I ever met with (one of fourteen years' standing), got on capitally at this home. The patient was on the high road to recovery, until presuming upon his excellent condition, he insisted upon relaxing the surveillance of which he was the object, in order to attend to several business matters of a worrying description. In consequence of this, he was immediately impelled to increase his dose of morphia, and the time at his disposal being limited, he had not completely broken off the habit when he was obliged to leave the institution. The case proves that, how-

ever well a patient may be progressing, he must arrange not to have any business to transact until he is entirely cured. Sometimes business is a mere pretext to recover the liberty of returning to morphia, but even when the reason is a true one, it has nearly always in my experience brought about a relapse.

The last condition, and one which is, perhaps, even more important than any, is the adoption of a proper method, not only of administering the decreasing doses of morphia, but also of general conduct. Morphia *habitués* are essentially creatures of impulse, and nothing is more distasteful to them than to order their lives methodically and soberly. But it is absolutely necessary that they should do so. The real difficulty in the cure of the morphia habit is not to arrange the progression in such a manner as to permit of the habit being given up without suffering, but to convince the patient that if the treatment is to be successful, it is only on condition of the greatest docility in matters of detail. Although, as I have just said, nothing is so distasteful to morphia patients as method and order, these are the absolute conditions of success, and a great step is already gained, when the patient has acquired this conviction.

Many patients will consent at once to the programme of reduction, as regards quantity, but when it comes to fixing the hours of administration, they will declare that no fixed rules can be adopted in their particular cases, because their requirements vary with circumstances; they may be entitled to a dose of morphia when they do not need it; and, on the other hand, be in want of the drug when they are not entitled to it. The reason is plausible, but it is better, notwithstanding, to insist upon regular hours, as method is paramount, and laxity of treatment at first invariably leads to ultimate irregularity. It may also be rejoined that, with the new methodical mode of living in other respects, which it is necessary to adopt, the requirements as regards morphia will not vary afterward as they did before. The patient must also understand that, as regards diet, he should take light digestible meals like any other convalescent at regular hours, and resist the morbid impulse that will often prompt him to make an extravagant meal at some unseasonable time—often in the middle of the night—washing down lobster salad or *pâté de*

foie gras with copious libations of brandy or dry champagne. There must be regularity as regards medicine; regularity with respect to meals; and last but not least regularity also with respect to repose.

Whether sleep comes at first or not, the light should be extinguished as soon as the last dose of the morphia has been taken, and reading in bed strictly forbidden. The pretext for reading in bed is the difficulty of sleeping, but in the morphia habit, even more than under ordinary circumstances, it is the habit of reading in bed that aggravates the insomnia. Whether the first few nights remain sleepless or not, the patient must try to woo back sleep by restoring night to its proper purpose, that of repose. It stands to reason, and I shall refer to this principle more fully further on, that if the morphia is expended in providing the intellectual energy necessary to enable the reading of a book to be enjoyed during the night, its effect in other directions is lost, and a larger quantity than otherwise need be is required to maintain a state of comfort. Those who know nothing about morphia will often suggest to a patient in a state of want to take a book and read. But morphia patients will know I am right when I say that such a recommendation is an absurdity. For them to be able to read, it is necessary, not only to have the organs of vision and the intellectual centre, but also that organs and centre be bathed with a sufficiently strong solution of morphia. Reading in bed, then, although one of our patients' chief pleasures, must be given up, in order to make the morphia go as far as possible.

Some *habitués* acquiesce in all these requirements, but with the mental reservation of doing what they please. Such patients are often very misleading, and more than one physician has been led to believe that some particular remedy has been of the greatest service, when, in truth, the patient has only been pretending, in order to get through the farce of treatment as soon as possible. Strange as it may seem, it is none the less true that a morphia patient will often pretend that he has been cured, rather than own to the doctor that he has cheated, or that he has been guilty of an imprudence that has thrown him back. Hence we hear, from time to time, of the extraordinary powers of some medicine, such as castoreum, avena sativa, or cannabis indica, in enabling, by

the aid of a few doses, the use of morphia to be given up without difficulty.

Hence, also, from a statistical point of view, the circumspection with which the statements of cured *habitués* should be taken. A gentleman who has taken morphia without interruption for the last six years declares solemnly that he was cured by me a couple of years since, and one of the stanchest advocates of my plan is a member of the diplomatic corps whom I have not seen since I was supposed to have pulled him through, also about two years ago, but who still continues the habit, to my certain knowledge.

There is another class with whom failure is almost certain, but for different reasons. This is the argumentative *habitué*, who knows more about morphia than any doctor living. Generally morose and suspicious, he often declares, although there is little fear of his putting his threat into execution, that if he is unsuccessful in his treatment he will commit suicide.

One day I received a pressing appeal from a gentleman of this class who had been at the Maison de St. Jean de Dieu for about a week. "I am constantly thinking about morphia, and my eyes are always on the clock, which never seemed to go so slowly. Please come to my rescue." I started off in the greatest haste, to find that he had just gone to take his coffee in a neighboring restaurant. In the course of a few minutes he returned, and appeared not a little astonished at my annoyance in finding that he had been out. He maintained that his absence had been necessitated by the rules of the house, which did not allow of coffee after meals. He admitted that it had been agreed between us that he was not to cross the threshold of the institution on any pretext whatever, and had I not discovered that he had done so, he would not have told me. But he argued that his absence occurring just after he had taken an injection, he was in want of no morphia at the time, and therefore did not run any risk. Here was a man, who confessed that he was constantly thinking of morphia, and who declared his intention of committing suicide should he fail to cure himself of the habit, and yet I could not bring him to understand that it was better for him to make coffee in his own room, or even to go without it entirely for a month or two, rather than to run into a temptation, which he had never before been able to withstand. I endeavored to

prove to him that the man who complains of the want of some little indulgence, is not in the frame of mind requisite for successful treatment, for if he realizes at its proper price the inestimable happiness of the escape from morphia, he ought to be convinced that recovery is cheaply purchased at the cost of a short temporary seclusion, coupled with some trifling interference with personal habits. I pointed out also that morphia patients seldom or never place themselves under our care, until they have proved by repeated trials that they are incapable of curing themselves, and it is only logical, therefore, that from the moment they do ask us to direct their treatment, they should cease to exercise any further disturbing influence. But all to no effect. The patient I speak of was argumentative and disagreeable all the time he was under my care. A large abscess having formed and requiring incision, he refused to have the slight operation performed because he did not think it was ripe for the knife, maintaining, moreover, that the patient was the best judge in such matters. The truth was that it afforded him an opportunity for injecting the solution of cocaine, that he obtained against my orders, and pretended to apply as a lotion. I completely failed to make him realize that he should have sufficient self-denial to give up any petty indulgence that might compromise his cure, and unity of purpose enough to order his whole life to the one end of avoiding temptation. Finding one day that he had gone out by himself, on the important business of obtaining a solution of morphia, of which I was not to be told, we had a final difference of opinion, which led to my retirement from the case.

CHAPTER III.

THESE preliminaries settled, it will be as well to understand clearly what is proposed to be done. What is the extent of the ordeal, for, if no worse, it is always an ordeal of patience and regularity, and what are the properties of the vital elixir from which the votary is to be weaned? "Me Hercle, non sedat," exclaimed the celebrated founder of the Brunonian school. The statement contained in this exclamation, by which Brown stands a self-acknowledged opium-eater, is neither entirely right, nor yet entirley wrong. Morphia is a sedative, even to the *habitué*, but not only or principally a sedative. Its predominating action is that of a stimulant, and this contradiction is not more flagrant than those which obtain in all its other effects, both of abuse and of abstinence. Whatever symptom may be the result of the habit, the opposite also is observed. And whatever may happen when its administration is withheld may also be the result of an excessive dose. The word stimulant, however, but feebly expresses the action of morphia in the organisms of its tributaries. I have often heard those who are imperfectly acquainted with its effects compare the slavery to that of alcohol and tobacco, and relate instances, sometimes their own cases, to show that, as regards the latter, it only requires a firm resolution to break at once with the habit. But irritable and restless as a man accustomed to other stimulants may feel for a few days after they have been given up, it is nothing to compare with the vital stoppage resulting from the sudden or too rapid cessation of morphia. It is no exaggeration to say that the unfortunate victims of the habit, are wholly and absolutely dependent upon their accustomed stimulant; so much so that it has almost become a condition of existence. The heart will scarcely beat without it, the brain only thinks by it, and digestion is entirely dependent upon it. In a word, morphia to its unfortunate slaves is the synonym of vital force.

It might seem, then, that there is but little chance of es-

cape from a thraldom so complete, or that, at the very least, it must be necessary to employ restraint. Such, I know, was the practical conclusion of a discussion at one of the medical societies in London, and such is the opinion, as I have already said, of the leading alienists. A physician, quoted by Dr. Mattison, expresses himself as follows: "Let him (the patient) quit it short, absolute and entirely. If he have the will-power, trust him; if he cheats, lock him up; put a Hercules over him as a nurse." As it is absolutely certain that no one whose addiction is of sufficient standing to warrant the expression, "morphia *habitué*," could leave it off suddenly by an effort of the will, the herculean nurse would become a necessity. Here is a picture of the treatment by the same authority: "All substitutes are simply a prolongation of the agony he must go through. . . . The patient who quits morphia, after a long-established habit, suffers from insomnia, diarrhœa, nausea, vomiting, achings all over, and debility to such a degree that it is a marvel how he lives. . . . All this suffering will last from five to ten days. No medicine will do any good, the stomach rejects everything, even a mouthful of cold water. . . . At last, after several centuries of torture, little by little, and without medicine or substitutes, nature accomplishes the cure. This terrible treatment, I am sure, is not only the best, but the only safe one to cure, and secure the patient from relapse."

Dr. Mattison very properly protests against this "brutal, barbarous, and inhuman plan of treatment," and shows how mistaken are these statements. The most important objection to my mind is that, dreadful as are the tortures inflicted, they do not, as a matter of fact, afford any safeguard against a relapse. Of nine cases of Obersteiner, "perhaps only one, at most two," says he, "may be considered as examples of complete permanent recovery." A glance at Levinstein's book will prove that most of his patients relapsed also, notwithstanding the unwarrantable tortures to which they were subjected. The best safeguard against relapse is really the re-education of the will effected by gradual progression, and for this reason, I prefer, as I have already said, the system of voluntary retreat and supervision, but without coercion.

Now as to the chances of recovery. During the last three years I have treated altogether thirty-two patients suffering

from the morphia habit. Seventeen of these underwent no proper surveillance, the patients sometimes having a friend or attendant with them, sometimes going about alone. Several of these professed that they were cured; but, in most instances, I had good reason to doubt it. The fifteen others agreed to a system of surveillance and retreat; but, as a rule, as soon as the restriction became irksome, some pretext was devised to show that there was an indispensable necessity for temporarily suspending the treatment, and whether it was resumed or not, the result was a failure. Only six cases adhered strictly to the agreed programme, and these six recovered. Three at St. Jean de Dieu, of five, ten, and fourteen years' addiction respectively, each taking from three to four months. One who locked himself up with his servant, whom he bribed not to allow him to cheat; the fifth, a lady supervised by her husband; and the sixth, a case of only a year's standing, but unique from the fact that the patient followed the treatment without deceiving his wife, who kept the medicines, although he was holding an important official position, and actively performing his duties the whole time. In the first cases, the time was unnecessarily long; but then my means of relief were more limited, and, although a certain programme, as it were, is laid down, which the patient can follow with a very little self-denial, he is allowed to have more morphia if he insists upon it, providing it is not taken secretly.

In my early cases, the object aimed at being the suppression of morphia, the patients were allowed too much latitude in other respects. Nearly every morphia *habitué* is sufficiently well acquainted with the literature of the subject to be more than a match in discussion for any one who has not a special knowledge of the subject. So it was that, when I first began to make the treatment of the morphia habit a special study, although I had the very best reasons for thinking that certain practices were imprudent, my patients were always able to quote some acknowledged authority in favor of their course of conduct. One maintained that he was helped by large doses of alcohol, an error, notwithstanding the books that indorse this opinion, for if the immediate effect is stimulating, the subsequent reaction makes a larger dose of morphia necessary, to combat the depression of the heart and vaso-motors. Another would insist upon having chloral at discretion. A third,

without appetite, as a rule, would be seized with a sudden fit of boulimia, and eat a heavy indigestible meal in the middle of the night, afterward suffering from dyspepsia, for which the proper treatment would be an emetic, but for which a morphia *habitué* always exacts an extra dose of morphia. A young lawyer, who had been getting on capitally, took it into his head that he could go faster with cocaine, and having, against my wish, procured a solution, began to inject it. After a few days, the effect upon his health and intelligence was most unsatisfactory, and he had every appearance of a man in the depressive stage of general paralysis. As he refused to follow my advice, and to give up the cocaine, I declined to continue the responsibility of the treatment, and left him to his own devices. In the course of a fortnight he was reduced to such a state of mental and physical prostration, that he was frightened at it himself, and asked me to resume the reins of government. After a short period of good conduct, he insisted, at the suggestion of a medical man, also under my treatment in the same institution, upon taking bromidia at discretion, and very nearly killed himself with an overdose. A second suspension of medical relations led to a final surrender at discretion, and henceforth things went smoothly. At the very last moment, an attack of gastralgia very nearly compromised the result, but fortunately it was dissipated by the action of a blister, and the much-dreaded insomnia of the last night being prevented by the hot-air bath, the patient, an *habitué* of ten years' standing, was ultimately cured.

Having been able to speak more certainly and authoritatively, my later patients have been more reasonable, and when the treatment has moderated the craving to a bearable extent, those who have really wished to get well have, as long as they have remained under my care, followed the reduction agreed upon, with but occasional moments of weakness.

CHAPTER IV.

THE weaning from the morphia habit may be divided into three periods. The first begins with the commencement of the reduction, and lasts until it is necessary to give some substitute for the decreasing hypodermic injections. This generally happens when the daily amount has been decreased to about two grains; it does not much matter whether the dose at the commencement was five grains or fifty. During this period it is better to give as few succedanea as possible, reserving all our resources for real necessity. Dr. Mattison commences with large doses of bromide, and after a week or so of this preliminary sedation cuts off the morphia very rapdily; but, as I have said before, we must be more degenerate on this side of the Atlantic, for I have never met with the same success without restraint. I have found it, however, an excellent plan to give the bromide at this time, as it calms the erethism of the heart and cerebral centres. It is sometimes well to associate it with sparteine or digitalis.

During the second period the progressive reduction of the hypodermics is continued, but this is rendered tolerable by the administration of a certain quantity of morphia by the mouth or rectum. For every centigramme diminished by the skin, two may be allowed in its place, and the mode of administration I have found most convenient is in the form of a solution injected into the bowel by the glycerin enema syringe. I formerly used suppositories, but the solution is preferable in that it acts quicker and has a more sensible effect.

There is usually no difficulty whatever during this period —at any rate, less so than toward the end of the first period— except with those who are victims of the "mania of the syringe," where the trouble is not to give up the morphia so much as to renounce the morbid pleasure of injecting. There are patients who would use anything rather than diminish the number or volume of the injections. I have known them experi-

ment with every drug that can be given in a liquid form, quite reckless as to the possible consequences. One gentleman treated by me, injected pure hydrate of amylene, and followed it up with a few drops of nitrite of amyl. Another for whom I ordered one-fifth-of-a-grain doses of sparteine, repeated the injections until he felt his heart contracting painfully, a sensation which naturally caused him alarm, mingled, however, with a fearful feeling of pleasure. Such aberrations seem almost incomprehensible, and, as far as sparteine is concerned, the case I have mentioned is unique, at any rate in my experience. When cocaine is used, it frequently happens that the injections are continued until they are followed by a feeling of impending death, and yet no sooner has the sensation passed off than a horrible fascination leads to a repetition of the dose, and the patient will go on injecting until he positively does not dare to risk another drop.

With the exception of these syringe maniacs, I have never had any difficulty during the second period, and most patients are agreeably surprised at the facility with which they leave off the hypodermic injections.

I recently directed the treatment of a lady, the wife of one of our most eminent physicians, who had taken morphia for twelve years for the relief of symptoms due to a tumor of the womb, accompanied by ovarian troubles. In this case I believe that the use of morphia had been the means of maintaining health, and that without it the nervous system would have broken down long before. The occurrence of phlegmonous abscesses, together with the cessation of the pelvic symptoms in consequence of "the change of life," made her at last desirous of escaping from the slavery, a desire that was shared intensely by her husband. Notwithstanding the patient's conviction that success was almost impossible, she passed through the successive phases of the reduction, giving up the injections, and continuing the subsequent diminution until she reached one grain by the mouth. Being unwilling to consent to a temporary suspension of her social duties, she made no further progress, and now oscillates between a grain and a grain and a half of morphia, taken by the mouth. Although the health is greatly improved, I consider the result a failure, but it shows that there is no difficulty in substituting some other mode of administration for hypodermic injection. When

this is effected the difference of dose may not amount to much, but it is always an immense moral encouragement for the patient to realize that he is no longer a slave to the syringe, no longer an impulsive morphinomaniac, and that at length his case has assumed the complexion of ordinary intemperance. He now seeks relief because there is a real, vital necessity, and it is for us to find the means of overcoming it.

When the syringe is given up the third period commences, and with it the final progressive decrease of the morphia. I shall give further on a typical table, but I need hardly say that few patients follow it with regularity.

As the periods of comfort become shorter and shorter, all the different means we dispose of to prevent the craving entering into the domain of consciousness must be employed. With the exception of cardiac tonics, many of these agents, both physical and therapeutical, act by inhibition. When an electrical current or any other form of energy is brought into the sphere of perception of the tired centre, it suspends the malaise, the mechanism of which has been explained above. The brain cells being occupied with the epi-peripheral stimulus, the ento-peripheral sensation arising from unsatisfied function is excluded from perception, for the time being, and although the former may not be efficient for healthy action, it gives to the cells the illusion of their accustomed stimulus. With this treatment the diminution can be carried on until the quantity of morphia taken is decreased to a small fraction of a grain. I have frequently seen patients get to a sixth of a grain, and even then require the greatest persuasion to make the final effort. There is always the conviction that small as may have become the last dose of morphia, it is impossible to do with none at all, and there seems to be something unbearable in the anticipation of the first night without it. As a matter of fact, the patient would be extremely restless if he had not certain means of combating the agitation, but even at the worst his condition would be but little more uncomfortable than that resulting from the insomnia and restlessness of severe dyspepsia, were it not for the knowledge that it could be allayed at once by a hypodermic injection. When the plan I have laid down is followed, there is, however, only one night of the kind. The second night from the last dose of morphia there may be insomnia, but there is no restless craving for morphia,

and henceforth, until sleep is properly re-established, there may be wakefulness, but it is a wakefulness that is quite bearable.

The three periods into which I divide the treatment are not purely arbitrary: they correspond to a natural and convenient division. I think, also, that there are many reasons for preferring a gradual arithmetical reduction, such as I have sketched out, to the fancy arithmetical and geometrical progressions advocated by some writers.

Besides the steady reduction, another point I aim at is the restriction of the number of injections, as the quantity injected becomes daily smaller. The most simple mode of reduction would be to divide the daily ration into a suitable number of equal parts, to be given at fixed hours; but experience shows that it is better to reserve the largest portion for the evening, and it is often advisable to commence the day with a liberal dose. The table given further on has often been my guide, and may be taken as a fair, practical basis.

I have tried other modes of reduction, such as making each dose smaller than the preceding one, or each interval between the injections a little longer, as also the ingenious method recently recommended by Dr. Little, of Dublin, consisting of replacing each dose taken from a certain quantity of solution by an equal quantity of water. Such a plan would be an excellent one if patients could be relied upon to carry it through without any hitch, but as such is not often the case, when a temporary backsliding does occur, it is difficult to know what amount of morphia was being taken at the time, and from what point, therefore, it is necessary to start a fresh. Dr. Little states that he has always found this plan successful in men and women; but I cannot help thinking that he has allowed himself to be deceived. It must be remembered that morphia *habitués* are a class of patients *sui generis*. With all the sympathy I feel for them, I cannot conceal the fact that they are "prevaricators" by impulse, and sometimes also through interest. They will often pretend to be cured from a morbid fear of hurting the feelings of the doctor who has unsuccessfully treated them; but I have known instances in which the comedy of treatment has been gone through to recover a situation, or to conclude a marriage; in the latter case even after an addiction of seven years. A Paris physician who treats all

his hysterical cases by hypodermic injections of morphia is under the impression that he can arrest the disease so created by hypnotism and suggestion, and each case reported by him ends with the mention: "The patient states she has entirely given up the injections." I must confess that no declaration on the part of a hysterical morphinomaniac would have much weight with me, and I think that a little more scepticism as regards their statements might often lead to very opposite conclusions.

Another point of some practical importance is the preparation of the solution. Although the patients under our care are undergoing a voluntary reduction, by a strange contradiction in harmony with their hysterical temperament, they are quite unable to resist the impulse to cheat, if an opportunity for so doing occurs. It is, indeed, only this peculiar state of mind that makes the semi-constraint I advocate at all logical: otherwise it would be more rational, either to deprive morphia *habitués* of liberty entirely; or to treat them like any other class of patients, with perfect confidence. To return to the question of the solutions. When the reduction is becoming irksome, the patient will often prefer to resort to some subterfuge in order to obtain the desired respite, rather than admit honestly that he cannot, or will not, continue to decrease. He will pretend, for instance, that he has spilled part of his allowance by overturning the bottle, or he will declare that he can feel that it is not of proper strength. In such a juncture argument is useless, as well as undignified, but if the pretext is allowed and the extra amount obtained, the following day the patient is less likely than before to be satisfied with the legitimate ration, and henceforth failure is certain. With the hypodermic tabloids of Burroughs & Wellcome, it is impossible to have any contestation of the kind. I have used them extensively during the past few years without any question having ever been raised as to their accuracy of dosage; the best possible proof that they are mathematically accurate. Another great advantage is that they do away with the danger of dirty and careless dispensing, by no means uncommon on the Continent through the negligence or ignorance of incompetent assistants.

Until within the last year, I generally used to prescribe some kind of hypnotic at the last critical moment, chloral,

methylal, hydrate of amylene, sulphonal, etc.; but now I rely mainly on the hot-air bath, repeated if necessary, and followed when practical by a cold douche. When a good Turkish bath is obtainable, it is all that can be desired; but in default of it, the best apparatus with which I am acquainted, is the portable Turkish bath, manufactured by Ellis & Co., of London.

For some time after the termination of the treatment I continue these baths, which are also the best means of preventing or combating any reviviscence of the craving, and it was through observing their action as preventive of relapse that I was led to use the simple hot-air bath as a means of treatment.

Such, then, being the general outline of the treatment, let us enter into some further detail.

One of the first indications is to make all the organs work as easily as possible, so that the gradually-decreasing morphia energy may suffice to keep the human machine going with as little discomfort as possible. By this means, the miseries which, in the aggregate, make up what is felt as a craving for the accustomed stimulant, are reduced to their minimum, and the different succedanea, which would be inefficient if employed without these precautions, become efficacious. In the second place, no unnecessary demand must be made upon the energy in general, or upon that of any organ in particular, for although the organism, restored to a proper balance, may manage to get along with the decreasing doses of morphia, we have, so to speak, nothing in hand, and the least call, either on the system in general or upon some particular organs, may excite an imperative craving for an increase of the habitual stimulant.

During the last period the patient must be literally content to vegetate. Amusements which are useful earlier in the cure, and later on, when the total suppression has been reached, should not be encouraged; that is, any amusements that require *entrain*. They will not, as is commonly supposed, enable the patient to forget the craving. They only cause the amount of morphia taken to be frittered away in unnecessary action, and if the excitement is enough to keep the patient going at first, the "go" is purchased at the expense of increased craving afterward, and an earlier demand for morphia.

The amount of exercise also requires the most delicate reg-

ulation, and the two conditions during the third period of reduction are, that it should neither be unnecessarily active, nor taken at the expense of the morphia energy. After each dose of morphia, a fictitious vigor returns for a time, but if this is expended in useless activity its duration is more ephemeral, and the want of the stimulant is felt earlier. It is better to economize the effect of each dose by remaining quiet as long as possible. As soon as a little restlessness is felt it may be relieved by a gentle walk, but after a time the restlessness is accompanied by a feeling of prostration, and although there is an instinctive desire to keep the legs and arms moving, the weight of the body makes exertion too tiring, and the attempt is soon given up. During this period of the reduction there are great differences in the symptoms experienced by different patients. In some there is chiefly prostration, in others restlessness predominates. A Turkish physician who was under my care at the private hospital of St. Jean de Dieu, remained in bed nearly all the time, and when he got up immediately repaired to the hammock, which allowed sufficient play to his limbs to satisfy all desire for movement, and at the same time obviated the necessity for making any exertion. When the opposite condition exists, there is no better means of satisfying this restless thirst for locomotion without fatigue, as moderate exercise on the tricycle (see for further details my book, "La Santé par le Tricycle," of which an English translation by Dr. Crosse Johnston is published by Iliffe, Fleet Street). The weight of the body is entirely removed, and provided a suitable road is available, the exercise of the limbs affords the greatest relief for the restlessness without causing the fatigue that might bring about an increase of the craving. It is, of course, easy in this respect to overshoot the mark, but used in moderation the tricycle may be turned to the greatest advantage, and when the treatment is once terminated, I consider this exercise, with the Turkish bath, as the best means of soothing the restlessness that occasionally remains, and so of obviating a relapse.

CHAPTER V.

JUST as there should be no demand upon the general energy that can be avoided, so each organ must be spared unnecessary strain, and, when required, special treatment must be applied.

The great dynamic centre is the heart, and the management of this organ is all-important. When a morphia *habitué* is in real want, the physical need is shown in the pulse, which

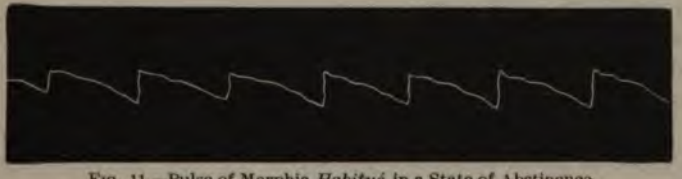

FIG. 11.—Pulse of Morphia *Habitué* in a State of Abstinence.

becomes small and labored, and presents the appearances previously described as characteristic of the craving, and of which, at the risk of some repetition, I subjoin a tracing. Should the morphia be withheld still longer, the pulse may pass into the condition seen in the next tracing where the impulsion of the heart is restored, and the characteristic plateau

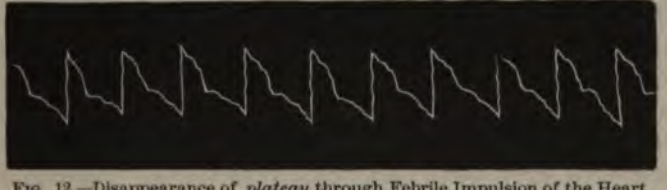

FIG. 12.—Disappearance of *plateau* through Febrile Impulsion of the Heart.

has disappeared, in consequence of the febrile state of the patient. In this case the morphia had not been absorbed in consequence of diarrhœa (it had been ordered to be given by the rectum), and the temperature was 40°, the pulse being 130. At other times the pulse tracing will present a shakiness

which is in accordance with the general restlessness, but it is difficult to say what part of the tracing is a pulse record, or how much depends upon muscular tremor. The following is a good specimen:

Fig. 13.—Advanced State of Privation.

Although German writers expect these tracings, I do not think it needful myself to wait for any manifestations of the kind, and consider the complete plateau as a legitimate indication for relief. (The tracings which best show the plateau are those obtained when the heart has not been modified by cardiac medicines. When heart tonics have been administered, the plateau takes much longer to appear, and is usually less marked. The craving is also proportionally less distressing. See in proof of this, Fig. 18.)

To prevent the weakness of the heart, of which the plateau is an indication, I was formerly in favor of sparteine, because its action hypodermically is rapid and mathematical, but I prefer now to keep the heart sustained all along, rather than give hypodermic injections from time to time. There is a great difference in individuals as regards tolerance for this drug hypodermically, and, although ten times the dose I would give by the skin to begin with, has been so administered, I would earnestly advise those who may try this plan to commence with a moderate dose. I have seen cramp about the heart, and precordial anxiety of a very alarming character, caused by the injection of one-third of a grain of sparteine; symptoms that were not relieved by brandy, and which only disappeared upon the hypodermic injection of morphia. The patient was an ex-*habitué*, and equally sensitive to digitalis. In this connection, it may be mentioned that this extreme sensitiveness to the action of cardiac medicines is more common than is generally supposed, and in heart cases, it is often thought that some particular drug is unsuitable, when, as a matter of fact, it is only that the dose is too large.

A governess, suffering from nervous derangement of the heart, giving the following sphygmographic tracing, was advised by me to take:

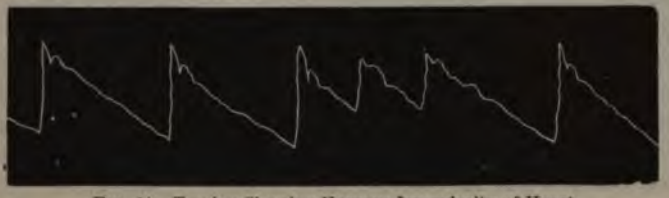

Fig. 14.—Tracing Showing Nervous Irregularity of Heart.

Ferri et quiniæ cit., . . .	℥ i.
Tr. digitalis, ...	℥ i.
Syrup. limonis, ...	℥ ij.
Aquam, ...	ad ℥ vi.

A tablespoonful to be taken three times a day. When I next saw her she told me that the medicine had produced such a violent action of the heart that, thinking I had made a mistake, and intended her to take teaspoonful doses instead of tablespoonfuls, she had reduced the medicine to that amount, the consequence being that it suited her exactly. Her tracing had become as follows:

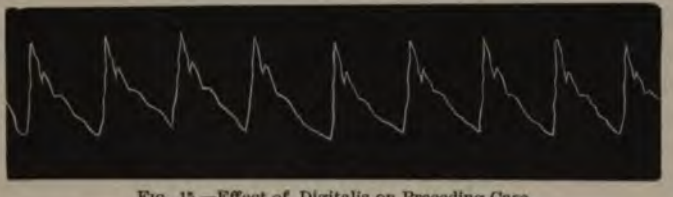

Fig. 15.—Effect of Digitalis on Preceding Case.

Thinking that in such small doses, the effect might be due to imagination, I had the digitalis omitted without her knowledge, and in the course of a few days the pulse returned to its first condition, becoming once more regular when the digitalis was resumed.

Another reason which led me to give up the hypodermic injection of sparteine, was that in many instances the chief element of difficulty in the treatment of the morphia habit is the mania of injecting. The morbid pleasure of injecting something under the skin is as great a fascination as the

effects of the morphia. When this is the case, one must be especially careful about allowing injections of sparteine, and invariably refuse to countenance the smallest addition of cocaine. I was shown one day by a physician, who had called me into consultation, and for whose patient we had recommended, among other things, hypodermic injections of sparteine, a most plausible letter, stating that the injections were painful, and asking if there was no way of rendering them less so. My *confrère* proposed that we should add to the solution a small proportion of cocaine, but I strongly advised him to do no such thing, as the invariable result of the hypodermic injection of cocaine is to develop the mania of injecting to an incomprehensible degree. I say incomprehensible, because, although a very small dose may produce a certain sense of relief, it is both incomplete and evanescent, having nothing of the vital turgescence resulting from morphia, and being followed almost immediately by an irresistible impulse to further injections. The patient feels an uncontrollable morbid impulsion, rather than a craving for stimulant, and what is most curious, each injection may be followed by the most alarming and distressing sensations, and yet no sooner have they passed off than another dose of the poison is taken. A gentleman told me that each sensation made him feel as if he were dying, and yet there was a horrible kind of pleasure in the feeling. Others have similar sensations, and feel them only to be disagreeable, and still they are unable to control the impulse that leads them to repeat the injection. (When the patient, and it soon is learned, knows that he can neutralize the discomforts caused by cocaine, to a certain extent, with alcohol, and almost mathematically with morphia, the case assumes the gravest aspects, and restraint may become necessary. I have known a morphia *habitué* who was taking, a few days before, four or five grains of morphia only, alternately inject morphine and cocaine for hours together, demorphinizing himself, as he expressed it, with cocaine, and neutralizing the overdose of cocaine with brandy and morphine, until he fell into a state of semi-coma, which would last sometimes for twelve or fourteen hours.) The propriety of refusing to add cocaine to the sparteine solution in the case I refer to, was speedily confirmed. Not obtaining the desired prescription from her medical attendant, the patient worked on the feelings of a too

indulgent and weak-minded father, and so procured a first solution, of which she promised to take only a few drops at a time, in order to be able to abolish the pain of the sparteine. The supply was soon exhausted, but the impulse once started, it became necessary to obtain larger quantities both of cocaine and morphine. Although she was not left alone for a moment, and had a young medical man attached to her person, she managed to purchase from twenty to thirty grains a day, without any one knowing it, for more than two months. At last, her husband, a medical man, and a morphia *habitué* himself, puzzled by the outbreak of hallucinations, which were set down by the father to deprivation of morphia, sent for me hurriedly one night. The symptoms being identical with those I had recently seen in a case of acknowledged cocaine-poisoning, I taxed the patient with taking it, and easily obtained a full confession. She had, notwithstanding the surveillance, retained the direction of her household, and had allowed a flighty maid to remain out half the night, on condition she should bring back the necessary supply of cocaine and morphine, which were entered upon her book of household expenses as butcher's meat or groceries. Speculating upon her mistress's passion, the servant had already made her pay for what had been supplied with various articles of jewelry, and the very day the affair was discovered, she had given her two valuable bracelets which had been pawned with an unlicensed receiver for over fifty pounds. It was partly through fear of the hallucinations, but more the dread of being in the power of her servant, that led the patient to make her confession. From her point of view, confession had also the advantage of establishing the fact that she was also a cocaine *habitué*, and, although I was in favor of cutting off the cocaine brusquely, other counsels prevailed, and in all her subsequent pretences at treatment, both morphia and cocaine were given concurrently.

The last time I heard of this patient, she had once more, when within a fraction of a grain of complete suppression, bribed the wife of a chemist to send her morphia in a double-bottomed bon-bon box at the price of two pounds a gramme; the cost price being about three pence.

Although the management of the heart is of primary importance, it is also necessary to secure, as far as possible, a healthy action of the other organs.

The liver is generally enlarged and sluggish, in consequence of the constant alternatives of active hyperæmia and passive stasis, which correspond to the alternate conditions of morphia satisfaction and abstinence. This functional disturbance of the liver is often aggravated by the immoderate use of alcoholic stimulants, and may so pass into organic disease, although it is less frequent than might be supposed *a priori*, and than theoretical writers have affirmed. I have pointed out such a common symptom of this condition in morphia *habitués* is oozing of blood from the nose or rectum. Every one knows that torpor of the liver leads to the congestion of the hemorrhoidal veins, and although it is now forgotten, Galen taught that hepatic congestion was often the cause of epistaxis, and recommended a blister over the region of the liver as the best treatment for nasal hemorrhage. In one of my cases, where the habit had originally been acquired for the relief of hepatic colic, the success of the treatment was on the point of being compromised at the last moment by severe gastralgia, but a blister over the stomach afforded the necessary relief, and the case terminated satisfactorily.

Another organ requiring no little management is the stomach, and this on account of its vast possibilities with respect to indigestion. The morphia *habitué* digests not with pepsin, but with morphine, and when the quantity is restricted it becomes necessary to tax the functions of the stomach as lightly as possible. Some authors recommend a liberal and nutritious food, and I have no objection to offer if it can be digested. But this is not the case at the end, when it generally happens that no food can be taken in comfort except in conjunction with morphia, and even then it must be of the lightest and most digestible kind. The question of diet becomes then of the greatest importance, as an imprudent meal may often cause a relapse of several days. One of my invariable recommendations, when there is any stomach difficulty, is the administration of bicarbonate of soda, in the form of Vichy water. Its effect in the relief of the craving brought about by imperfect digestion is often immediate, and is probably not limited to the neutralization of the over-acidity of the stomach. Alkaline solutions increase the efficiency of the heart's action, and cause contraction of the capillaries, a result which lessens abdominal stasis, and helps to facilitate the general circulation.

The avoidance of indigestion is not only an important precaution during the reduction cure, but it is one of the chief things to be observed as an after-precaution. More early relapses are brought about by indigestion than by any other cause, and the occasion is not infrequently the festive gathering that celebrates the return of the ex-*habitué* to society. Notwithstanding the best resolves, he allows himself to be over-persuaded, and rises from table with the sense of discomfort, increasing as the evening draws on until he has reached the highest intensity of dyspepsia, that threatens and even may be the imminence, of heart failure. Many ex-*habitués* are hypochondriacal about the state of their heart, and it is difficult under the circumstances to resist resorting to a hypodermic injection that past experience has shown to be infallible. I have already said that the best treatment of such a case would be an emetic of hot water, and I have just alluded to the great value of bicarbonate of soda as a preventive of indigestion. Another remedy, which I have only appreciated at its proper worth within the last few years, is linseed, which was counselled by Trousseau in a variety of gastric affections. Both for morphia *habitués* and others I know of no medicine to equal it, in slow, laborious digestion, accompanied either by pain or heaviness, and in flatulent dyspepsia, either with constipation or diarrhœa. By the relief it affords to the gastric symptoms it becomes a marvellous remedy also in a number of reflex nervous and hypochondriacal symptoms.

CHAPTER VI.

THE plan sketched in the preceding pages will be sufficient to bring the treatment to a successful issue in most cases where the patient has started with the earnest resolution to get well, but there are sometimes symptoms that require special attention, and for which there are plenty of means of relief. Before, however, passing these in review, I will relate a few cases as illustrations of my method under different circumstances.

A distinguished officer had contracted the morphia habit for the relief of gastralgia, having its origin in the privations of a campaign. When he consulted me he had just been appointed to an important official post. I was desirous to defer treatment until the work incident to his accession to his new duties had been got over, the more so as there could be very little surveillance. His wife, however, was anxious to begin at once. The amount taken was between two and three grains daily, and the habit was only of a year's standing, but the patient had already made repeated attempts at curing himself, which had always failed in consequence of the want of a proper method.

I wrote him out a programme according to which he was to diminish, by a quarter of a grain hypodermically daily, and to substitute half a grain by suppository for each quarter given up by the skin. At the end of eight days the four grains taken by the rectum were to be diminished by a quarter of a grain a day. Sparteine was prescribed by the mouth as a heart tonic, tablets of trinitrin, and inhalations of nitrite of amyl for the relief of the craving, should it be felt toward the end of the treatment, hydrate of amylene for the last night.

At the expiration of six weeks my client, who had taken his medicines with him in the form of Burroughs & Wellcome's tabloids, returned to Paris and informed me that the treatment had been followed to the letter, and that the last dose of

TABLE OF REDUCTIONS.

	8 A.M.	2 P.M.	4 P.M.	7 P.M.	12 P.M.
1	10	10		10	10
2	9	9		9	9
3	8	8		8	8
4	7	7		7	7
5	6	6		6	6
6	6	5		5	6
7	5	5		5	5
8	5	4		4	5
9	4	4		4	4
10	4	3		4	4
11	4	3		3	4
12	3	3		3	4
13	3	3		3	3
14	3	2		3	3
15	3	2		2	3
16	2	2		2	3
17	2	2		2	2
18	2	2		1 (II.)	2
19	2	2		(II.)	2 (II.)
20	2	1 (II.)		(II.)	2 (II.)
21	2	(II.)		(II.)	2 (IV.)
22	1 (II.)	(II.)		(II.)	2 (IV.)
23	1 (II.)	(II.)		(II.)	1 (VI.)
24	(IV.)	(II.)		(II.)	1 (VI.)
25	(IV.)	(II.)		(IV.)	(VI.)
26	(IV.)	(II.)		(II.)	(VI.)
27	(III.)	(II.)		(II.)	(V.)
28	(II.)	(II.)		(II.)	(IV.)
29	(II.)		(III.)		(IV.)
30	(II.)		(II.)		(IV.)
31	(II.)		(II.)		(III.)
32	(II.)		(II.)		(II.)
33	(II.)		(I.)		(II.)
34	(II.)				(II.)
35	(I.)				(II.)
36	(I.)				(I.)
37					(I.)

morphia had been taken on the day and at the hour anticipated. He was, of course, unable to tell me what help he had derived from the sparteine, but he was enthusiastic in praise of the nitrite of amyl, which he had constantly carried in his pocket, and which had arrested the craving whenever he had resorted to it.

This case shows that a cure may be obtained under methodical treatment, without seclusion and with imperfect surveillance, but successes of the kind are rare, and can only be hoped for in mild cases, and where there have not been any previous failures.

A medical man, aged 32, was brought to me by his cousin, a well-known alienist. The habit had originated in family annoyances, and was of two years' standing. I transcribe the progression from beginning to end, in order that it may serve as a model for others as regards the mechanism of the reduction. He was taking at the time sixty centigrammes a day, which was rapidly reduced to 40 taken in 4 doses. From 40 to 24 the decrease was at the rate of 4 centigrammes a day, from 24 to 16 it was 2 daily, from 16 to 8, 1. From 8 to 6 the decrease was at the rate of 1 daily with an allowance of 2 by the rectum for every one suppressed hypodermically. As soon as 0 by hypodermic injection was reached, the progressive decrease of the morphia taken by the rectum was commenced and carried out according to the foregoing tableau.

Although the final result was unsatisfactory, the patient relapsing at the last moment on account of paroxysmal cough which nothing but morphia could relieve, the table shows how to conduct a typical reduction. The eventual failure proves, moreover, that there was a real difficulty, which had only been kept in abeyance, thanks to the methodical exactitude with which all the directions were carried out.

The compensatory morphia, noted in the tableau with bracketed Roman figures, was given in the form of a solution administered by means of the glycerin enema syringe, an instrument that might have been devised especially for the purpose. This plan has the advantage over suppositories of being always accurate as regards dosage, and much quicker in effect, the patient having the satisfaction of appreciating the cessation of the commencing malaise. The hypodermic morphia was given in the form of tabloids. Although complimented

daily by his cousin and myself upon the punctuality with which he followed his treatment, my *confrère* declared that he suffered so little discomfort that there was no merit on his part in adhering to the programme. Sometimes he was himself surprised, and would ask us if we had not hypnotized him into obedience to our wishes. At one time there was a commencement of that mental yearning which is much more distressing than pain, but this was kept under by frequent applications of the galvanic current, the anode on the nape of the neck, the cathode on the forehead. He took sparteine internally during the whole of the treatment, as well as bromide of sodium, and used faradization and trinitrin whenever there was restlessness. Finally, when he had reached the amount of one centigramme by the mouth, he was seized with repeated attacks of convulsive paroxysmal cough, for which everything which he and I could think of was tried in vain. Painting the fauces with nitrate of silver, local applications of cocaine, large doses of bromide, inhalations of ether, and hypodermic injections of phosphate of codeine, together with many other sedatives and anti-spasmodics, all were used without success. Under the influence of ether the cough would cease, as it did also in the hot-room of the Turkish bath, but it was, of course, impossible to keep up this treatment continuously, and the patient returned temporarily to a small quantity of morphia, promising me to give it up as soon as he got to a warmer climate. My own opinion was that the cough was neuromimetic, as I had remarked all through the treatment an almost feminine degree of sensibility in other various respects. It must be said also, that, although when the treatment was first decided upon, the patient and his cousin had both agreed with me that supervision was necessary, the absence of all disagreeable symptoms caused it to be relaxed, and at the last moment he was certainly overtaxing his resources. I do not know how the case ended, but as the patient set out upon an arduous journey soon after, and has never been near me since, it most likely terminated in a complete relapse.

A lawyer, aged 35, has been addicted to morphia a little over ten years, having been taught the practice by his medical attendant for the relief of hepatic colic. The practitioner in question seems to have been certainly culpable, having propagated the use of the syringe among his patients in the

most imprudent manner, leaving them to employ it at their own discretion. The consequence was that in a small provincial town my informant knew of at least a dozen *habitués*. But, unfortunately, the habit once formed, the doctor had been powerless to help him out of the difficulty, appearing to think that it was simply and purely a question of will, and that he could leave off the practice whenever he liked. After several futile attempts at breaking with it, he decided upon coming to Paris, and when he left home his body and limbs were so covered with abscesses and his health so shattered that no one expected to see him return alive.

The tableau of the preceding case applies exactly to this patient, with the exception that on several occasions relapses occurred in consequence of different therapeutic experiments that he insisted upon trying, and during which our professional relations were suspended. A long time was lost with cocaine; a whole week through a bad attack of indigestion, and a few days through an abuse of bromidia.

In no instance have I seen a better illustration of the part played by the heart in the causation of the craving, and of the importance of heart tonics in the cure of the habit. Up to the eighth day of the treatment, which was pushed as rapidly as possible, no succedanea of any kind were given, but on that day I made the following note: Saw Mr. —— a quarter of an hour before the time for making the injection. He was depressed, tearful, and restless, and complained of uncomfortable sensations about the heart. Said he would rather give up the treatment at once than continue so to suffer. The tracing of his pulse was as follows:

Fig. 16.—Example of Heart Weakness of Morphia Craving.

A few minutes after the injection of the morphia it was perfectly restored (Fig. 17).

I then explained to him that while desirous of reducing the daily quantity of morphia as fast as possible, and refraining from the administration of succedanea as long as they could be dispensed with, it is never necessary to inflict the

suffering corresponding to the first of the above tracings (Fig. 16). Such a tracing is, on the contrary, the indication

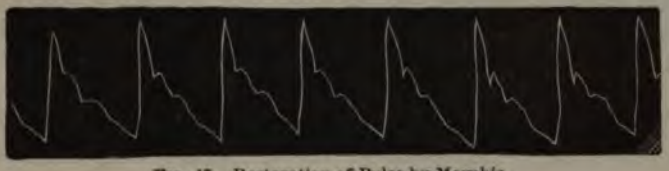

FIG. 17.—Restoration of Pulse by Morphia.

for slower progress—[we had decreased from forty to eighteen centigrammes, about four grains, a little more than half the quantity taken, in eight days]—or for the administration of a heart tonic. I prescribed digitalis, and for the remainder of the treatment there was no further trouble with the heart, the following tracing being the worst I obtained:

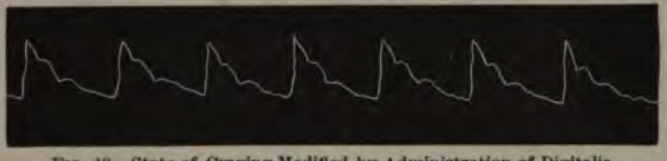

FIG. 18.—State of Craving Modified by Administration of Digitalis.

The chief interest of this case, however, centres in its termination, it being brought to a satisfactory conclusion thanks to a hot-air bath that was administered the evening after the last dose of morphia, and which brought about a comfortable sleep, although a few hours before the patient was despairing of being able to get through the night. It is worthy of remark that I had at the same time under my care a medical man, who always spoke with the greatest confidence about the strength of his will, and his certitude of overcoming the habit, provided I could only make him sleep. Curiously enough, the administration of hyoscine by the rectum procured him regularly twelve hours' sleep, a result I have never seen from it in any other instance. Notwithstanding this, I was not surprised one morning to find that my patient had decamped. As I have said and repeated, a morphia *habitué* must be in real earnest if he wish to get well, but protestations of energy are no proof of strength. Patients who are too self-reliant are often inclined to modify their treatment unknown to the

doctor, according to their own ideas, whereas past failures being a proof of their incapacity, it would be far better if they would leave themselves entirely in their adviser's hands. The best criterion of earnestness is consent to all the conditions laid down, more particularly those of which the patient does not understand the import.

Two instances of cure have already been given; of the others, one was a lady, who followed the treatment laid down under the supervision of her husband, whom she consented to take as her jailer; the fourth a gentleman, who owed his recovery to the intelligent care of his servant, who carried out the instructions I gave him to the letter. The fifth was the first case in point of time, that upon which my first paper on the subject was founded, and referred to an *habitué* of five years' standing, addicted to cocaine and alcohol as well. (This case forms the subject of my first memoir on the question in "L'Encephale," 1887.) The last case of cure is that of a gentleman who had taken morphia for 14 years, and who had been in special establishments half a dozen times at least. The great bar to his recovery was a fixed pain in the head and cerebral excitement, which occurred whenever he was in a state of craving. The case was peculiar in that it was the only one in which I ever observed a persistence of sexual power, which was certainly increased. The patient had a large family, the youngest child being six months old, and the only one whose health was at all defective was the eldest, born before the father had commenced to take morphia. Gelseminum and codeine were successful in controlling the pain, and for the last week the patient took Turkish baths regularly. Shortly after the cessation of his treatment he began to drink heavily, and this soon led to a return to morphia.

CHAPTER VII.

In the course of treatment a number of minor discomforts are complained of, for which the patient is always anxious to try some new medicine, more particularly anything with a name ending in "ine," and so it happens that the sitting-room of a morphia *habitué* is often almost as well stocked with poisons as a toxicological laboratory. Although relief must, of course, be afforded when really necessary, the mania for taking a different drug for every symptom must be combated, otherwise it will lead to an accumulation of opposite remedies, the result of which is anything but salutary.

The action of sparteine has been already dwelt upon, but I think that the doses fixed for hypodermic injection by some French writers are much too high. I have known the most uncomfortable sensation about the heart follow an injection of two centigrammes, and I believe that the administration of an overdose of this drug has caused death. I now prescribe sparteine by the skin but rarely, preferring to sustain the action of the heart by an even tonification to giving it sudden pulls up, from time to time. The dose by the mouth is about five or six centigrammes three times a day. A patient of mine, suffering form cardiasthenia, took sixteen centigrammes instead of four by the mouth, in consequence of a mistake—the chemist having written a tablespoonful instead of a teaspoonful of the mixture. Had I not been obliged to tell him of the mistake in order to avoid a repetition of it, I do not think he would have suspected the overdose. As it was he said he felt "queer about the heart."

Digitalis has also been dealt with in Chapter V., but I may couple it with sparteine in saying that one of the two should be given as soon as the amount of morphia taken daily does not suffice to keep the pulse of full amplitude—that is to say, just as soon as the plateau appears in the sphygmographic tracing, before the time fixed for each morphia injection. The

dose is a question of idiosyncrasy, and I have quite recently seen another patient whose heart's action became depressed and irregular after a few days, at eight drops a day.

An overdose of a cardiac tonic, digitalis, sparteine, or cocaine (for, although I do not prescribe it, many morphia patients come to me taking it on their own account), exaggerates the discomfort which a suitable dose would relieve, but within certain limits the symptoms due to an overdose may be relieved by the administration of a supplement of morphia. I am speaking, of course, of morphia *habitués* and of those who have taken an overdose as a substitute for morphia. When, as it sometimes happens, the excessive dose has been taken by an *habitué* from that recklessness which will lead such patients, particularly when it concerns cocaine, to go on injecting successively a little too much of the one, and then a little of the other to neutralize the first, the best treatment consists of dry friction, mustard leaves, particularly over the heart and nape of the neck, and a moderate amount of brandy and coffee by the mouth and rectum. I have seen some cases of great gravity, all of which recovered by these means.

Trinitrin is useful where there are symptoms of chilliness, and in suitable doses gives a faint illusion of the hypodermic injection. When taken until its physiological action is produced we can obtain a break in the monotony of the craving; and, supposing that from the time the uneasiness first appears until that fixed for the injection a couple of hours have to be passed, they may be broken up into periods of ten minutes of craving, with five-minute intervals of comfort, which is far less distressing than two hours' absolute misery. The compound trinitrin tabloids of Burroughs & Wellcome are elegant preparations, and the addition of a small quantity of nitrite of amyl renders them more efficient.

Nitrite of amyl and iso-butyl nitrite have the same properties as trinitrin, but in a more powerful, rapid, and ephemeral degree. One of my patients carried a small bottle of the first in his pocket, which he smelled at repeatedly, and to which he attributed his recovery. Like trinitrin, they are not tolerated by every one, and should be used with caution wherever there is organic or nervous trouble about the heart. As in angina pectoris a small dose may do good, but a large one often aggravates the evil.

Bromide of sodium, or the combinations of the bromides of sodium and ammonium, are recommended by Dr. Mattison as a routine treatment, and I must confess that I know of no means so efficacious of combating the morphine-nostalgia as I have termed the mania of the syringe. Patients will often dilute their solutions four or five times in order to have a larger amount of fluid to inject, but when they take bromide they are more ready to content themselves with the effect of the morphia, and their brain cells cease to be polarized in the direction of the syringe.

The fluid extract of coca is a valuable preparation for relieving restlessness, and morphia patients can generally take it in teaspoonful doses, frequently repeated. The morphia habit creates a tolerance for coca and cocaine, but those in attendance upon these cases should recollect that it is not the same for them. In June, 1888, I prescribed this fluid extract in half-teaspoonful doses to a young lady suffering from nervous prostration. The very first dose was followed by symptoms of poisoning, giddiness, prostration, small rapid pulse, pain at the epigastrium, and impossibility to remain in any but a recumbent position. It was three days before she entirely recovered. In July, 1889, a young lady in attendance upon her cousin, a morphia patient, coming home very tired and nervous, took the amount of the extract of coca generally taken by her relative several times a day, and which was probably about the third of an ounce. She was shortly afterward seized with vomiting and prostration, and when I saw her at the expiration of an hour, the breathing was excessively shallow and suspirious, pulse 140, the whole surface cold and clammy, the patient convinced that she was going to die, and complaining particularly of the head and heart. The way in which the pillows and bolster were thrown aside, and the head buried in their place was characteristic of poisoning by cocaine, as was also the position of the body, a peculiar sprawl on the side, leaning over on the stomach as much as the flexion of the limbs would permit. The patient was too incapable of collecting her faculties to make any reliable answer, but said "Yes" in answer to my inquiry as to whether she saw a peculiar spectrum around the candle, described to me under similar circumstances by a morphino-cocainist, and consisting of concentric colored rings like a lunar rainbow. None of the reme-

dies usually applied in such cases were successful. I had administered on arriving a hypodermic injection of morphia, which I had expected to see relieve the symptoms at once. Nitrite of amyl gave no better result. Coffee and mustard leaves had been resorted to before my arrival; and, as I had no personal experience of the hypodermic injection of strychnine in such cases, I hesitated to use it, except as a last resource. With coffee, brandy, and inhalation of ammonia she gradually got better, but remained in a sufficiently critical state to require medical supervision the whole night, a medical friend remaining in the house. What is still more remarkable, the next day she felt and appeared quite well. This is so unusual after an excess of cocaine, that had it not been for certain symptoms, I should have felt inclined to look upon the whole affair as an attack of hysteria.

I am convinced that there is still much to be learned about coca and cocaine, and some of the statements made by surgeons respecting the latter are profoundly injudicious. It is often said that several grains of cocaine may be injected hypodermically without danger, but many people cannot stand even a fraction of a grain without discomfort, and are seriously inconvenienced by a dose of a grain. A couple of years since I painted the fauces of a middle-aged gentleman, a general officer, with a one-in-twenty solution, of which it is impossible that more than three or four drops, at the outside a fifth of a grain, could have been absorbed. Within a few minutes he looked strange, and felt giddy as if he were going to faint. I laid him down flat on the ground, when all the symptoms passed away, returning as soon as he attempted to rise up. As it was during my consulting hours, I was obliged to take him into an adjoining room, and, although brandy was administered to him in sufficient quantities, it was fully an hour before he recovered.

It is an interesting fact, and one that has not been noted, that the acquired tolerance for cocaine may be lost. One of my patients, who formerly took fifteen grains of cocaine daily, and as much morphia, cannot at the present day take a quarter of a grain of cocaine, or a teaspoonful of liquid extract of coca, without being prostrated in consequence for several days. I have no desire to undertake a crusade against coca, but I think it right to utter a warning against its misuse as

a cerebral or mental stimulant, which I feel sure the future will indorse. The different wines and elixirs of coca have at the present day an immense vogue. When Weston was supposed to keep himself going by chewing coca leaves, the leading English physiologists came to the conclusion that the belief in its virtues was a delusion. Experience shows that the legends of the South American Indians performing feats of strength and endurance, thanks to its aid, may be received as historical facts. But coca is not without danger, and it has already been my lot to witness nervous and cerebral breakdowns under its use, which could not be attributed to any other cause.

Cannabis indica. Of this drug I have no personal experience, and the evidence concerning its value is somewhat contradictory. Dr. Mattison advises teaspoonful doses of the fluid extract, one-in-one, to be given and repeated frequently. In conversation with myself he assured me that there was no danger, and that its toxic power is feeble. It is his practice to give large doses of bromide for a few days, and then to withdraw the morphia rapidly, the cannabis indica being given as a hypnotic. He says, moreover, that small doses are exciting, and therefore worse than useless. Notwithstanding the assertions of Dr. Mattison, I have never ventured upon the larger dose, but, on the other hand, after what he has said, I did not think it worth while to try the smaller. An Indian practitioner contributed a short paper to the "Lancet" stating that small doses of the extract, one to two grains in pills, had cured two cases of opium habit that he had been called upon to treat; but, although he added that the patients did not know what they were taking, success of the kind is so contrary to all experience that I cannot help thinking there was some deception; of co··rse I mean on the part of the patient. Although morphia patients, like all others, are quite free to put an end to the treatment whenever it becomes irksome, I have never yet met with one sufficiently straightforward to tell me that he would prefer to give up the attempt. But it is extremely common for them to pretend to get on phenomenally well, with or without the aid of some drug, and at the expiration of a short time to declare they are cured. A few months ago a case went the rounds of the medical press of a woman who had acquired the morphia habit, and who

was cured by a German physician with a few doses of tincture of castoreum. The Indian cases probably belong to the same category.

Atropine has the same action in those addicted to the morphia habit as under other circumstances, being, as a rule, an absolute controller of perspiration. A hundredth part of a grain twice a day by the mouth is sufficient. Since the introduction of the hypodermic tabloids, some morphia *habitués*, Americans more especially, have been accustomed to use a combination of morphia and atropine. In the only case of the kind I have met with, the heart was left, after the cure, with a very tired beat. In a case of poisoning by atropine over three-fiftieths of a grain were taken hypodermically by a morphia *habitué;* the whole of the body became intensely dry and red as a boiled lobster in the course of five minutes. The sight was lost to such an extent that very little could be perceived but light and darkness, the throat dry and constricted, and the heart rapid and incoherent. A third of a grain of pilocarpine restored the patient to absolute comfort, with moist skin and throat, and a regular action of the heart, but the vision did not become normal for several days.

Codeine and its phosphate in the form of the hypodermic tabloids produce a certain amount of calm, but I have not used them sufficiently often to have formed a definite opinion of their value.

Gelseminum is of use in dental neuralgia, but it is better for the patient to have his teeth, which are nearly always in a bad state, attended to before commencing the treatment. If this is not done, the carious teeth make themselves felt at a critical moment, and often serve as an excuse for a relapse.

Hydrate of amylene is sometimes useful, but I have not found it reliable. It is the routine narcotic at the Maison de Santé, at Schönenberg.

Sulphonal is one of the newly-introduced hypnotics. It is not easily soluble, and is, therefore, difficult to administer in a mixture, unless given with gum acacia or tragacanth. The dose is from twenty to thirty grains, and the drug often acts on the night following its administration. I have recently administered it extensively, and think that if reserved for a critical moment it may be of service. After a few doses, however, it usually fails, in morphine cases, to procure sleep. Ex-

ceptionally it may render the greatest service, and I have recently seen two cases where it proved remarkably useful. The first was a lady who had been unable to make the slightest progress under the direction of her husband, himself a medical man, chiefly because she suffered from constant discomfort about the heart, entirely caused by the hypodermic injection of sparteine. I substituted digitalis, and insisted upon having the complete and absolute direction of the case. In fifteen days the amount of morphia was reduced from thirty to eight centigrammes, and there had not been a single uncomfortable feeling of any importance. Under the influence of sulphonal there were from ten to twelve hours' sleep each night. At this point the husband, foolishly imagining that he had learned all my little secrets, insisted upon resuming the treatment himself, the result, as I had foreseen, being an immediate relapse, the one secret of success being the separation of husband and wife.

The second case was that of a lady brought to me by one of the leading physicians of Havre. She had been taking sulphonal for some weeks, and under its influence she had been able to reduce by herself from sixty centigrammes to ten, and it was in order to make further headway that I was consulted on her account. In a third case, that of an American lady, sent to me by a physician in San Francisco, sulphonal was so efficacious for a time that the patient declared it relieved her even more than morphia. This effect did not, however, prove lasting.

Hyoscine. In one instance it gave twelve hours' sleep in the dose of $\frac{1}{75}$ of a grain by the rectum, but in other cases I have been entirely disappointed by it.

Valerianate of ammonia is a refreshing sedative, and was recommended by De Quincey. It is one of a number of small means which I nearly always employ, and the sum of which contributes largely to the patient's comfort.

Bicarbonate of soda I have already spoken of at some slight length. Slight digestive difficulties are often relieved by it.

I mention Avena sativa and hopeine only to put morphia patients on guard against them as therapeutical frauds.

Besides the preceding therapeutic remedies, a number of other physical agents and appliances may be made to render the greatest service. Hot-water enemata are the best means

of controlling diarrhœa. Mustard leaves over the heart relieve nervous feeling about that organ, and, at the nape of the neck, soothe cerebral restlessness and insomnia. The hammock combines the possibility of rest and motion, and is therefore useful when there is that state of restlessness and prostration which makes it equally difficult to remain still or to keep moving. The patient experiences the fidgets, or, as the French call it, "*des inquietudes*" (a sensation of which it is very difficult to give a description), chiefly in the forearms and shins. The same kind of sensations, although in a lesser degree, are sometimes felt in gout, neurasthenia, and other conditions, and often delay sleep, but they may be relieved as a rule by friction, and pass off after a time. The morphia fidgets are characterized by the fact that though they be masked by suitable treatment, as soon as the application is suspended they return with renewed intensity, and can only be arrested by a dose of morphia. Morphia patients will understand the description of this restlessness as a kind of organic anxiety, "*anxietas tibiarum*," a nervous orgasm caused by the physical expectation of constantly-impending but delayed relief. When the treatment is conducted too quickly this restlessness is also felt in the brain. There is then a maximum of prostration, and the patient is compelled to lie on a bed or a couch; but rest is impossible, and the head is tossed from side to side in fruitless search of repose, while the general restlessness prevents any lengthened stillness of the body. With moderate progression, the degree of unrest is quite bearable, and, even when a complete cure has not been obtained when the means I advise are employed, I have constantly seen the hypodermic injections given up, and a considerable decrease made in the quantity taken by the mouth or rectum, without distress.

For the different degrees of restlessness I employ the hammock, which is often sufficient, friction, faradization, and the Turkish bath. Should there be cerebral restlessness, as will happen when the patient has been deceiving and is striving to recover his ground without making a confession, small mustard leaves at the nape of the neck or the hot-water bottle are what I usually rely upon. Ascending galvanic currents, of from 3 to 5 milliampères, are also of the greatest service.

Hot baths promote calm and sleep, but they are not to be compared with the hot-air bath, which I always use at the

end of the treatment, both for procuring sleep and allaying restlessness.

The moderate restlessness which occurs when patients are properly treated disappears entirely in the hot-room of the Turkish bath, and the subsequent massage and cold douche form the most perfect sedative that a morphia *habitué* can be allowed. There is no better means, moreover, of dealing with the revival of the craving that occurs afterward from time to time, especially under the influence of indigestion. If a Turkish bath is not available, the best substitute for it is Ellis's portable apparatus, which several of my patients have used with success. Massage à frictions is by itself useful in soothing the fidgets, but electricity in the form of faradization is better. The sensation caused by the faradic current covers this distressing sensation perfectly.

Galvanism is, according to Dr. A. Mattison, the best mode of treating the pains that sometimes threaten to compromise the result at the last moment. I have also found the ascending current second only to bromide in relieving some of the head symptoms.

NOTES ON THE EXAMINATION

OF THE

Sputum, Vomit, Fæces, and Urine.

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NOTES ON THE

EXAMINATION OF THE SPUTUM, VOMIT, FÆCES, AND URINE.

THESE memoranda are strictly confined to the most essential points in the examination of sputa, vomit, fæces, and urine, requisite for clinical observations, and they lay no claim to any originality either in subject matter or in the form in which it is presented. For fuller details as to methods and analysis, recourse must be made to such works as v. Jaksch's "Clinical Diagnosis" (Dr. Cagney's translation), Wethered and Wynter's "Clinical and Practical Pathology," and the many excellent manuals of clinical medicine that are now at the disposal of the student.

THE SPUTUM.

GENERAL CHARACTERS AND COMPOSITION.

Mucoid, muco-purulent, purulent, watery, serous, sero-sanguinolent, sanguinolent.

Aërated; non-aërated.

Thin, fluid. Thick, viscid, tenacious.

Homogeneous; nummulated.

Colorless, yellowish, greenish, bile-stained, blood-stained, rusty, pigmented.

May contain:

Cheesy and calcareous masses.

Particles of coal and other dust.

Fibrinous casts. Membranous exudations.

Hydatid membrane.

Foreign matter, as cotton fibre, hairs, food-particles, etc.

Microscopical Examination.

1. *Mucus-corpuscles, leucocytes, pus-corpuscles,* often fattily degenerated.

2. *Red blood-corpuscles.*

3. *Epithelia.*

(*a*) Squamous—buccal.

(*b*) Ciliated—from nose or trachea.

(*c*) Columnar—from trachea or bronchi.

(*d*) Spheroidal or elliptical, finely granular, often containing granules of black pigment—from pulmonary alveoli; generally contain oil-globules and myeline masses (in cases of malignant disease of larynx or lung, some cancer cells may occur in the sputum, but they are seldom distinctive).

[Nuclei brought into view by staining or by addition of acetic acid.]

4. *Elastic tissue.*

May be detected by adding caústic soda or potash to specimen; or more effectually by collecting large quantity of sputum and boiling it with equal amount of solution of caustic soda, until it has lost viscidity (avoid over-boiling); pour mixture into conical glass, and add 4 or 5 times quantity of cold distilled water. Set aside, and after 2 or 3 hours, examine deposit.

Recognize elastic tissue by its curling fibres with dark borders. (In phthisis the fibres may retain outlines of alveoli. Elastic tissue also met with in chronic laryngitis, bronchitis, bronchiectasis, and chronic pneumonia.)

[N. B.—Cotton fibres, etc., not to be mistaken for elastic fibres.]

5. *White fibrous tissue.*

(Seldom occurs, except in cases of abscess and pulmonary gangrene.)

6. *Curschmann's spirals.*

Consist mostly of white central thread covered by fine twisted fibrils, often entangling epithelial elements. (Of frequent occurrence, especially in capillary bronchitis and asthma.)

7. *Bronchial tube casts.*

Composed of fibrinous or croupous exudation; distinguished by dichotomous division corresponding to bronchial ramifica-

tions. (Small and not always present in acute pneumonia. Characteristic of plastic bronchitis, in which sometimes of large size and extent.) (Shreds of membrane may be expectorated in diphtheria; they are composed of fibrin entangling epithelia and leucocytes.)

8. *Corpora amylacea.*

Rare, met with in pulmonary hemorrhage (Friedrich).

9. *Crystals.*

(*a*) Charcot-Leyden crystals: colorless, pointed, octahedra, insoluble in cold water, ether, alcohol, chloroform; soluble in alkalies, mineral acids, hot water, acetic acid.

(Met with in asthma [often with 6] and bronchitis, acute and chronic.)

(Similar crystals were discovered in leukæmic blood by Charcot; they also occur in semen.)

(*b*) Hæmatoidin: Long rhomboids or needles of ruby-red color.

(May occur after hæmoptysis, and in chronic congestion from heart disease.)

(*c*) Cholesterin: Highly refractile, rhombic plates, often with one angle cut out, as it were; soluble in chloroform; turning red with sulphuric acid.

(In phthisis and abscess of lung.)

(*d*) Fat crystals (stearin, palmitin), very pointed, acicular, in bundles; soluble in ether and hot alcohol, insoluble in water and acids.

(In putrid bronchitis, bronchiectasis, pulmonary gangrene.)

(*e*) Tyrosin, as masses of acicular crystals. (In same conditions as *d*.)

(*f*) Ammonio-magnesium phosphate, and oxalate of lime occasionally.

10. *Fungi.*

A. Non-pathogenic. *a*. Moulds, as oïdium albicans, aspergillus.

b. Yeasts, as torula.

c. Bacteria (including leptothrix buccalis) and micrococci (including sarcina pulmonis).

B. Pathogenic. *a*. Bacillus tuberculosis: Small, slightly-curved rods (measuring 1.5μ to 3.5μ) often containing spores (from 2–6) which give the bacilli a beaded appeaance. For their detection special selective staining is required.

Method of Staining Tubercle Bacilli.

1. Select opaque particles of sputum to size of half a pea.
2. Spread out an even layer by pressing between two cover-glasses, and sliding them apart.
3. Dry between fingers over flame, smeared side downward.
4. Pass three times quickly through flame to fix albumin, etc.
5. Place 3 drops of Neelsen's solution on preparation, and warm till steam rises.

[N.B.—Take care not to burn or warm unevenly. Tilt about cover slips.]

6. Wash off excess of stain, and decolorize in acid (*i.e.*, either H_2SO_4—25 p.c., or HNO_3—33 p.c.), taking care to remove all stain. Test by frequent washing until it becomes a lavender tint. [Time, about 15 seconds.]
7. Wash off all acid thoroughly, and put on one drop of methylene blue. [Time, about 5 seconds.]
8. Wash off and dry in fingers over flame.
9. Mount in cedar oil (temporarily), or in xylol or balsam of Peru, or in Canada balsam.

Neelsen's solution: Fuchsin, 1 part, dissolved in a 5-per-cent watery solution of carbolic acid, 100 parts; alcohol, 10 parts.

Another Method.

1. Select opaque particles of sputum to size of half a pea.
2. Spread out an even layer by pressing between two cover-glasses, and sliding them apart.
3. Dry between fingers over flame, smeared side downward.
4. Pass three times quickly through flame to fix albumin, etc.
5. Float cover-glass on surface of few drops of Weigert-Ehrlich solution in watch-glass.
6. Warm over flame till vapor seen to rise fom surface.
7. Remove specimen from watch-glass and allow it to cool.
8. Wash it in nitric acid (1 in 4).
9. Then in distilled water.
10. Then in weak alcohol.
11. Dry and mount in Canada balsam.

Weigert-Ehrlich solution: Saturated aqueous solution of anilin, 100 c.c.; saturated alcoholic solution of fuchsin, 10 c.c.

b. Diplococcus pneumoniæ.

Specimens prepared as above, but without decolorization by nitric acid.

[Other micro-organisms in pneumonic sputa are the bacillus pneumoniæ (Friedländer), streptococci, and staphylococci.]

c. Actinomyces, or Ray-fungus. Of rare occurrence in human subjects, composed of clavate-shaped bodies radially arranged.

11. *Infusoria.*

Monas and cercomonas (met with in pulmonary gangrene).

12. *Vermes.*

a. Echinococcus. Hydatid membrane (laminated) or hooklets.

b. Bilharzia. Ova—spicule at one extremity. (This parasite has been found in the lung.)

THE VOMIT.

These notes do not apply to cases of poisoning.

Reaction.—Acidity may be due to normal gastric juice (HCl mainly) or to products of fermentation (acetic, lactic, butyric acids chiefly). Reaction may be neutral, or even alkaline (*e.g.*, watery vomit, which is largely due to saliva).

Characters.—May be watery, mucous, sanguinolent, biliary, purulent, fæcal.

May consist largely of—

1. Water or saliva; thin, colorless, clear fluid (as in "water-brash," "morning sickness," "hysterical" vomiting).

2. Mucus, mingled with gastric juice (as in gastric catarrh).

3. Ingesta, in variable amount, and either quite undigested or semi-digested. [Note especially masses of casein from curdled milk.]

4. Fermentation-products (sarcinous vomit), often of frothy "yeasty" character and sour odor. (Best seen in cases of dilated stomach from pyloric stricture, where vomiting occurs at long intervals and in large amount.)

5. Bile, frequently mingled in small amount with mucus

and gastric juice. This "bilious vomiting" has mostly a bright green color (which may deepen on exposure), due to production of biliverdin by action of the acids of gastric juice. (In "cerebral" vomiting, in acute peritonitis, and other conditions where vomiting is repeated frequently and in small amount.)

6. Blood, in variable quantity. If copious hemorrhage, then may have blackish clots and much fluid blood, but slightly altered; or if it has remained some time in the stomach to be acted on by gastric juice (or in the case of mineral acid poisons, when this change at once effected), the vomit has the characteristic "coffee-ground" color due to action of acid on the hæmatin of blood.

Hæmatemesis.—Blood in vomit may not be derived directly from the stomach, but may come from epistaxis, or from pharynx or œsophagus, and thence enter the stomach to be ejected subsequently. Or in larger amount may enter from rupture of an aneurism into œsophagus. A frequent source of gastric hemorrhage, sometimes very copious, is portal obstruction (cirrhosis of liver); but the most common sources are gastric ulcer and cancer. As a rule the hemorrhage is more profuse, and the vomit therefore composed more of unaltered blood in ulcer than in cancer, where the "coffee-ground" character is more frequent.

7. Fæcal matter gives a yellowish, greenish, or brownish color to vomit, and a penetrating odor. (Significant of intestinal obstruction from any cause. Also in the rarer case of a gastro-colic fistula).

8. Pus—a rare concomitant (implies rupture of an abscess into the stomach).

The character of the vomit depends on the predominance of one or other of the above constituents.

Examination.

1. Note quantity; character; reaction.

2. Free HCl, if in large amount, causes decoloration of methyl-anilin violet (aqueous solution); and gives yellow or brown tint to "emerald green."

[There is excess of HCl in most cases of gastric ulcer, but a partial or total deficiency in cases of cancer.]

3. Lactic acid deepens the tint of dilute solution of ferric chloride.

4. Microscopical Examination.

(i.) Blood-corpuscles—white and red—altered and swollen.

(ii.) Blood-pigment in granules.

(iii.) Squamous and columnar epithelium.

Food residues, as:

(iv.) Muscle-fibres—swollen, variously disintegrated, often deep yellow color, and striation well marked.

(v.) Oil-globules.

(vi.) Fat-crystals (needle-shaped).

(vii.) Connective-tissue fibres, elastic and white.)

(viii.) Starch-granules, note markings, refractile appearance, and blue coloration on addition of iodine.

(ix.) Vegetable cells (note chlorophyll) and jointed fibres (not to be mistaken for foreign matter).

Fungi, as:

(x.) Moulds.

(xi.) Yeasts, notably Torula cerevisiæ; oval and spherical spores, and perhaps some mycelium. Also other kinds.

(xii.) Bacteria, micrococci, especially the Sarcina ventriculi, recognized by large size, "wool-pack" appearance and yellowish tint.

THE FÆCES.

Consistence.—Solid (scybalous), semi-solid, pultaceous, loose, mucoid, slimy, fluid, watery.

In constipation the motions are hard, dry, often in small rounded masses. In the various forms of diarrhœa their consistence varies from semi-solid, loose motions, to watery stools, the latter being also produced by hydragogue purgatives. In catarrhal enteritis, often slimy and mucoid; also in cancer of rectum. In the diarrhœa of typhoid fever, the stools may have a characteristic appearance, compared to pea-soup, being thin and watery with much drab-colored sediment. In cholera they are very watery, and contain flakes of epithelium (rice-water stools).

Amount.—Scanty or copious; if solid, note the size of motion and its calibre.

Flattening of solid motions may signify stricture of colon (*e.g.*, sigmoid) or rectum.

Reaction.—Alkaline or acid.

Normally slightly alkaline, but the reaction depends on quality of food as well as on fermentation changes in intestine. Pronounced alkalinity may be due to albuminous disintegration; it is found in certain forms of dyspepsia, and in typhoid fever. In acute enteritis, and especially infantile diarrhœa, the reaction is acid.

Color.—Dark brown, bright yellow, pale yellow or drab, putty-like and white, greenish, or black. Varies with degree of admixture with bile, with alterations in the bilirubin after its excretion, with presence of blood, with kind of food ingested, and of drugs that may be administered.

Examples.—Stools may be drab-colored or putty-white in obstructive jaundice or deficient bile formation. Greenish in infantile diarrhœa (due to acidity and conversion of bilirubin into biliverdin? or to fermentative changes?). Also often greenish after taking calomel. They are blackened in cases of hemorrhage high up in the intestine (melæna) from formation of sulphide of iron. Also from similar change—the stools are black, when iron, bismuth, or manganese are being taken. Blood—if unaltered (*i.e.*, in copious hemorrhage from ulceration of ileum or colon, or from rectum) and pus—give their characteristic color to the motions. The fæces may be of bright yellow tint, if rhubarb, senna, or santonin be taken.

Odor.—A highly offensive odor developed under various conditions, mostly attributable to fermentation changes in albuminous materials; when bile is deficient, this character usually obtains.

Constituents.—Masses of undigested food, *e.g.*, casein from milk; vegetable matter, grape-skins, orange-pulp, currants, seeds, fruit-stones, etc.

Foreign bodies—accidentally swallowed.

Excess of fat.

Observed in cases of pancreatic disease and obstructive jaundice.

Shreds or complete "casts" of false membrane, and of epithelium.

As in membranous enteritis, and also in chronic ulceration of bowel (*e.g.*, tubercular ulceration).

Enteroliths.

Gall-stones and biliary concretions.

The search for them should be carefully made by breaking up the motion in water and straining through muslin.

Intestinal worms.

The presence of these parasites may be diagnosed by the detection of their ova in the fæces on microscopical examination (*vide* p. 533); but the worm itself, or in the case of tapeworms, its proglottides, are sufficiently large to be seen by the unaided eye. An exception may perhaps be made in the case of the trichina, which is the smallest of these entozoa. The leading characters of the chief varieties are as follow:

Tænia mediocanellata—fully 4 metres in length, often more. The head (1.5 to 2 mm.) with central groove or depression, and furnished with 4 suckers, generally surrounded by black pigment. No hooklets. The ripe segments or proglottides, which are passed in the motions, are opaque, white, oblong (measuring about 18 by 5 mm.); the genital pore projects from one margin, and the uterus, filled with ova, is remarkably branched.

Scolex stage passed in the ox.

This is the commonest tapeworm in this country.

Tænia solium—attains less length than the T. mediocanellata. Its head (about 1 mm.) presents four lateral suckers, and bears anteriorly a rostellum around which is placed a double row of hooklets, about 26 in all. The ripe proglottis, narrower than preceding, contains a uterus, which in the much smaller number and greater width of its branches contrasts markedly with that of T. m. The genital pore is lateral.

Scolex stage in the pig.

Common in Germany.

Bothriocephalus latus—from 5 to 8 metres in length. The head (2.5 mm. by 1 mm.) is elongated, with rounded end, and provided with a groove passing from before backward. The segments are much broader in proportion to length than in the Tænia, the width increasing until near the terminal extremity. The genital pore is placed on the surface of each segment, and the uterus has a rosetted appearance and does not fill the segment.

Larval form in river fish—*e.g.*, pike.

This form of tapeworm chiefly met with in N. Germany, Finland, and Switzerland.

In the case of a Finn lately in the Middlesex Hospital, the intestine contained no fewer than 14 of these worms.

Ascaris lumbricoides—the largest intestinal nematode, the adult male measuring about 250 mm. and female 400 mm. The ordinary "round worm" infesting small intestines (of children especially), seldom solitary, sometimes 5 or 6 present.

Oxyuris vermicularis or thread-worm; males, 2.5 to 4 mm. in length; females, 10 to 12 mm., white in color, and posterior extremity spiculated. Its habitat is the rectum and descending colon.

Tricocephalus dispar, or whipworm, distinguished by the filamentous character of its anterior extremity, contrasting with the rest of the body. Measures 40 to 50 mm. in length. Infests especially the cæcum.

This parasite has been found in great abundance in cases of beri-beri, or "tropical anæmia."

Trichina spiralis—found in intestine in the adult sexually mature form, from 1.5 to 3 mm. in length.

Anchylostoma duodenale—males smaller (6–10 mm.) than females (12–18 mm.). Head bears a protruding mouth furnished with teeth, whereby it wounds the mucous membrane, and may cause intense, even fatal anæmia.

Anguillula.—Two forms (intestinalis and stercoralis) have been met with; they are smaller than Anchylostoma, which they somewhat resemble.

Microscopical Examination.

1. Intestinal products.
a. Epithelial cells, mostly columnar, bile stained.
b. Red blood-corpuscles and blood-pigment.
c. Leucocytes. Pus-corpuscles.
d. Flakes and shreds of fibrin (membranous enteritis).
2. Food residues.
a. Muscle fibres. Yellow stained.
b. Elastic and white fibrous tissue.
c. Fat-globules and crystals.
d. Vegetable cells and fibres.
e. Starch-granules.
f. Detritus.
3. Crystals of (*a*) hæmatoidin, (*b*) cholesterin, (*c*) fatty acids, (*d*) lime salts, oxalates, carbonate, sulphate, (*e*) triple phosphate, (*f*) Charcot-Leyden crystals (*vide* Sputum).

4. Ova of intestinal worms (for characters of these parasites, see p. 532).

(*a*) Tænia mediocanellata.—Nearly spherical, with thick shell, striated radially; in size—0.035 mm. by 0.039 mm.

(*b*) Tænia solium.—Similar to (*a*), but slightly smaller (0.033 mm. by 0.032 mm.).

(*c*) Bothriocephalus latus.—Ovoidal (0.07 mm. by 0.045 mm.), and shell provided at one end with operculum. Coarse brown granules in interior.

(*d*) Anchylostoma duodenale.—Oval (0.05 mm. by 0.023 mm.), clear shell, with granular contents often showing cell-division.

[The importance of detection of these ova is sometimes great, the symptoms of anchylostomiasis being those of pernicious anæmia, which disappear on the expulsion of the parasite by anthelmintic remedies.]

(*e*) Tricocephalus dispar.—Characterized by a nodular swelling at each pole of the well-marked shell.

(*f*) Oxyuris vermicularis.—About 0.052 mm. long and half that in width; granular contents in which nucleus and nucleolus visible.

(*g*) Ascaris lumbricoides.—About 0.05 mm., surface covered with conical projections.

5. Certain forms of protozoic organisms, as monadinea, coccidia, cercomonas intestinalis, amœba coli.

6. Moulds, yeasts, bacteria, micrococci, and the following pathogenic micro-organisms:

(*a*) Spirillum of cholera (comma bacillus of Koch).

(*b*) Spirillum Finklerii (cholera nostras).

(*c*) Bacillus tuberculosis.

(*d*) Bacillus of typhoid.

THE URINE.

General and Physical Characters.

Quantity.—Normal daily average for adults, 40 to 50 ounces.

Increased (polyuria) by excess of fluid ingesta, renal degeneration (granular and waxy kidney), nervous conditions (diabetes insipidus, hysteria). Also in convalescence from acute disease; in recovery from acute nephritis; during ab-

sorption of fluid serous effusions; in cardiac disease after relief of dropsy.

Action of diuretics, as digitalis, nitrous ether, scoparium, juniper, acetate and nitrate of potash, copaiba, etc.

In diabetes mellitus.

Diminished by restriction of fluid ingesta and increased activity of sweat-glands in acute nephritis; fevers; certain nerve conditions—*e.g.*, hysteria.

Suppressed in acute and chronic nephritis, obstruction of ureters, etc.

Color.—a. As regards amount of urinary pigment (urobilin).

From pale, limpid, watery (as in diabetes insipidus, hysteria, granular kidney) to dark reddish-yellow (as in scanty loaded urine of acute febrile conditions, mitral disease, etc.).

b. From admixture with blood or blood-coloring matter. From brownish tint to bright red.

c. From admixture with bile. A yellowish-green tint, or dark olive-green and brown, depending on degree and duration of jaundice.

d. From admixture with chyle (chyluria). Milky white.

e. Melanuria from pigment excreted in cases of melanotic sarcoma.

f. From drugs.

Carbolic acid, urine darkens, becoming almost black, after standing. So also kairine, antipyrine. Santonin gives saffron-yellow tint. Rhubarb, brownish or red. Senna, ditto.

Transparency.—Especially clear and bright if saccharine, or albuminous (often).

Turbidity.—May be due to presence of excess of (1) lithates (in cooling); (2) phosphates; (3) pus, epithelium; (4) mucus; (5) blood (smoky urine); (6) chyle (chyluria).

Odor.—Ammoniacal, from putrefactive fermentation. Acetone odor, in diabetic urine. [Special odors from drugs—*e.g.*, turpentine; or articles of diet—*e.g.*, asparagus.]

Specific Gravity.—Depends on relative proportion of solids to water, and especially urea. Normal—1020 to 1025.

[Rough estimate of percentage of solids obtained by multiplying the last two coefficients of the specific gravity by 2.33, the resultant representing so many parts per 1,000—*e.g.*, specific gravity 1020, $20 \times 2.33 = 46.6$ per 1,000, or 4.66 per cent of

solids; again, specific gravity 1036, $36 \times 2.33 = 83.88$ per 1,000, or 8.4 per cent. Urea equivalent to about three-fourths of total quantity of solids.]

Reaction.—Acid, neutral, alkaline.

Acidity due to acid salts (urates and phosphates). Influenced by diet, drugs, and fermentation. Ordinary fermentation with conversion of urea into carbonate of ammonia by micrococcus ureæ.

Chief Sedimentary Deposits.

Urates.—Generally pigmented (pinkish) because they carry down pigment with them. Are deposited on urine cooling, and can be readily dissolved by warming it.

Phosphates.—Generally in pale urine, forming white feathery deposit, insoluble by heat, soluble in nitric acid. The alkaline phosphates increase as urine ferments, when also ammonium urate formed.

Uric Acid.—Scanty, but characteristic; as fine red dust or sand, it constitutes "gravel."

Oxalates.—Recognized by bright crystalline character.

Pus.—White deposit.

Blood.—Generally forms a dirty reddish-brown deposit.

Qualitative Analysis.

1. *Urates.*—A deposit soluble on heating.

2. *Phosphates.*—Precipitated by heat, soluble on addition of acid.

3. *Uric Acid.*—The murexide test: Place a few grains on porcelain dish, add drop of HNO_3, apply heat, and when nearly dry, expose to fumes of NH_3; a crimson color developed where the NH_3 in contact.

4. *Sulphates.*—Precipitated by baryta water.

5. *Chlorides.*—Precipitated by nitrate of silver (previously add HNO_3).

6. *Urea.*—Concentrate the urine by boiling, add HNO_3, crystals of urea nitrate formed.

7. *Indican.*—Add carefully some HCl so as to form stratum below urine. At line of junction a deep blue or almost black tint developed, according to amount of indican present.

Or more delicately with further addition of calcic hypochlorite, and the indigo may be dissolved out in chloroform.

Urine normally contains some indican, but such an excess of this substance, as to give a marked reaction, is usually only to be found in disease. It is especially abundant in intestinal obstruction, and more so in the acute than the chronic form; but it also occurs in cancer of the stomach, peritonitis (acute and chronic), and in wasting diseases (*e.g.*, phthisis).

Closely allied to the indican-reaction is the deep-red tint obtainable (also in intestinal derangements) on boiling with nitric acid, which changes to yellow on further addition of the acid. The red tint can be regained by carefully neutralizing with ammonia or sodic carbonate.

8. *Ehrlich's Diazo Reaction.*—For this color test, the following solutions are required:

A.	Sulphanilic acid, ...	1 part.
	Nitric acid, ...	2 parts.
	Distilled water, ...	100 "
B.	Nitrite of sodium, ...	1 part.
	Distilled water, ...	200 parts.

Shortly before use mix 100 c.c. of (A) with 2.5 c.c. of (B).

About 10 c.c. of this mixture is added to an equal amount of urine in a test-tube. The tube is now shaken, and a few drops of liq. ammoniæ are added, when the fluid and the foam on its surface assume a bright red tint.

This reaction is obtained in the urine of typhoid fever (according to Ehrlich, as soon as the middle of the first week), also in that of measles, and sometimes even in pneumonia and phthisis. Although of some value in the early diagnosis of typhoid, it is said to be present in acute tuberculosis also.

9. *Albumin* (serum).—Is coagulated by—

a. Heat, *i.e.*, boiling in presence of excess of acid (acetic or a few drops of citric acid).

b. Nitric acid, added in the cold. Form stratum of urine on surface of the acid in test-tube. Not to be mistaken for crystalline deposits of urates or nitrate of urea; or the cloudiness produced by the acid in urine of patients taking copaiba.

c. Picric acid.

d. Ferrocyanide of potassium in acid urine. (This secured by addition of citric acid.)

sodæ) converts the deposit into a viscid glairy fluid. For this reason such urine, if also ammoniacal, becomes "ropy."

Pus is present in the urine, in urethritis (gonorrhœa), cystitis, pyelitis of all forms, also in renal abscess, or from the rupture into the urinary tract of abscesses situated external to it. In women leucorrhœal discharge may account for the deposit.

15. *Mucus.*—Flocculent; often as a filmy cloud floating in the urine. Is soluble in alkali, and can be reprecipitated on addition of acetic acid.

16. *Sugar.*—*a.* Moore's Test.—Add equal portion of liq. potassæ, and boil. Dark reddish-brown color developed, with odor of caramel.

b. Trommer's Test.—Add a few drops of cupric sulphate solution, and then liq. potassæ until get clear fluid. Boil, get yellowish or orange-colored precipitate (of cuprous oxide).

c. Fehling's Test.—Similar to (*b*), but the alkaline cupric solution previously prepared, consisting of cupric sulphate, sodio-potassic tartrate, and caustic soda. Red precipitate.

d. Böttiger's Test.—Take a few grains of carbonate of bismuth and boil with urine in presence of excess of alkali. The white powder becomes black (suboxide of bismuth).

e. Johnson's Test.—Boil with picric acid and then add potash. A deep red color produced.

f. Mulder's Test.—Solution of carbonate of soda added to urine; then solution of indigo-carmine. On heating the color changes to yellow, and again becomes blue on shaking with air.

17. *Acetone*—In some cases of diabetes, this substance (or rather aceto-acetic acid) may be detected by the red color produced by addition of ferric chloride.

18. *Bile Pigment.*—Bilirubin converted into biliverdin by HNO_3. Addition of this acid gives therefore a "play of colors" (red to grass-green). Test best seen by noticing effect of action of drop of acid on drop of urine placed on porcelain plate; or by soaking white bibulous paper in urine, and when dry placing drop of acid upon its surface.

19. *Bile Acids.*—Pettenkofer's Test. To mixture of sulphuric acid and urine, add gently concentrated solution of cane sugar. A purple color produced. (Test open to fallacy; from charring of sugar by acid.)

20. *Drugs.*—Perchloride of iron gives purplish-colored precipitate in urine containing: (*a*) carbolic acid; (*b*) salicylic acid; (*c*) antipyrine; (*d*) kairine, etc.

Copaiba gives cloudy precipitate on boiling, soluble in alcohol (not to be mistaken for albumin).

Tannin, dark green with perchloride of iron.

Santonin and rhubarb, red color on addition of alkaline carbonate.

Iodine, liberated by HNO_3 or chlorine water. When shaken up with chloroform, the free iodine appears as red solution.

Quantitative Analysis.

I. Urea.

A. Estimation by Mercuric Nitrate (Liebig's method).

Reagents.—a. Volumetric solution of mercuric nitrate (of which 10 c.c.=0.1 gm. of urea; or 1 c.c.=0.01 gm., *i.e.*=1 per cent).

b. Baryta solution (2 vols. of baryta water and 1 of saturated solution of barium nitrate).

c. Carbonate of soda solution (20 grs. to the ounce).

Apparatus.—1. Centimetre measures.

2. Burette graduated in cubic centimetres.

3. Filters and filtering paper.

4. Beaker.

5. Porcelain plate.

6. Glass rod.

Process.—1. Take 40 c.c. of urine. [If albuminous, first boil and filter.]

2. Add 20 c.c. of (*b*) to precipitate sulphates and phosphates.

3. Filter.

4. Collect 15 c.c. of filtrate (*i.e.*, 10 c.c. of urine) in beaker or dish.

5. Fill burette with (*a*), and drop it into the filtered urine.

[Note when a definite precipitate forms, subtracting that amount, as indicating chlorides.]

6. After having used 10 c.c. of (*a*), place drops of (*c*) on porcelain plate, and after each addition of (*a*) to the urine, test for free mercury by mixing with (*c*). Cease as soon as yellow color (*i.e.*, yellow oxide) replaces white.

7. Then read off number of c.cs. of (*a*) used before the yellow color appears.

Example.—For No. 5, suppose 3 c.c. of (*a*) used before a definite precipitate appears. For No. 6, when 33 c.c. used, get yellow color with carbonate of soda. Therefore 33—3=30 c.c. of volumetric solution required to decompose whole of urea in 10 c.c. of urine. So that 30×0.01 gm.=0.3 gm. in 10 c.c. of urine, or 3 gm. in 100 c.c., *i.e.*, 3 per cent.

Easy then to calculate total amount of urea from the total amount of urine passed in 24 hours.

B. Hypobromite Method.

In this process, urea estimated by amount of nitrogen given off in decomposition of urea by hypobromite of soda, thus: $CH_4N_2O+3BrNaO=3BrNa+2H_2O+CO_2+2N$. The CO_2 is absorbed by the excess of alkali, so that all gas evolved is nitrogen.

Reagents.—Solution of sodic hypobromite freshly prepared.

[Take of bromine, 1.3 c.c., and mix with caustic soda solution (1 in 25), 13.7 c.c., so that forms 15 c.c. of hypobromite solution.]

Apparatus.—Russell and West's.

1. A pipette graduated to 5 c.c.

2. A long tube with bulb and constriction into which glass rod protected by India-rubber may be inserted to act as stopper.

3. A trough to contain water, into floor of which the open mouth of (2) is fixed.

4. Gas-receiver, a graduated tube closed at one end. Portion of this tube, of capacity of 55 c.c., is divided into 30 equal parts. Now 55 c.c. of N=0.15 gm. of urea, therefore each single division on the tube=0.005 gm. of urea. Since the total quantity of urine used in the analysis amounts to 5 c.c., each division of the tube will indicate 0.1 per cent. of urea, and the whole 30 divisions, 3 per cent.

Other more or less convenient forms of apparatus, all constructed on same principle, viz., to collect and measure the gas evolved by decomposing a given quantity of urine by hypobromite, are those of Gerrard, Doremus, and Thursfield.

The Process.—(*a*) Measure 5 c.c. of urine and place in bulb of tube (2), which can then be fitted into floor of trough.

(*b*) Fill bulb with water up to constriction, and then insert stopper firmly, and fill rest of tube with hypobromite solution.

(*c*) Fill trough with water, and also the tube (4), which must now be inverted and moved over site of (2).

(*d*) Remove glass stopper; gas at once rises, and displaces water in (4). Note amount when all action ceased.

C. Hypochlorite Method.

On similar principle as *B*, but solution of chlorinated soda employed instead of hypobromite.

Squibb's apparatus, usually employed for this, consists in two bottles of equal size, one of which (*A*) is filled with water, and communicates by an India-rubber tube with the other bottle (*B*), and by another tube with a beaker (*C*).

Four c.c. of urine in small test-tube, placed in *B*, and then 40 c.c. of liq. sod. chloratæ are poured into *B*, which is then tightly corked and connection made with *A*. The bottle *B* is agitated so that the urine and hypochlorite freely mix. Gas is given off actively, displacing water from *A*, which is received in *C*. At close of experiment measure the water in *C*, which indicates amount of N given off.

Example.—Since 1 c.c. of N = 0.0027 gm. of urea, if 36 c.c. of water displaced by evolved gas, then $36 \times 0.0027 = 0.0972$ gm. of urea in 4 c.c. of urine, or 0.0243 gm. in 1 c.c., or 2.43 per cent.

II. Sugar.

A. Estimation by Fehling's Solution.

Fehling's solution: Cupric sulphate, gr. 90½; pot. tartrate, gr. 364; sol. sodic hydrate (sp. gr. 1.12), fl. oz. 4; water, to fl. oz. 6.

Since this solution is of such strength that 200 parts is reduced by 1 part of sugar, the total reduction of 200 grains of the solution is equivalent to 1 grain of sugar; or 10 cubic centimetres of solution to 0.05 gm. sugar.

Apparatus.—1. Porcelain dish.

2. Spirit-lamp or Bunsen burner.

3. A glass measure (grains or cubic centimetre).

4. Burette graduated in grain-measures or cubic centimetres.

5. Glass rod.

Process.—Take some urine and dilute it with distilled water (1 in 10) and fill (3) with the mixture.

Measure 200 grains of Fehling's solution (or 10 c.c.), dilute it with water (equal parts or more), and boil.

While boiling, drop in dilute urine from burette, stir up freely and cease to add urine directly all blue color discharged from the solution.

Then read off quantity of dilute urine used.

Example.—Suppose 1,000 grain-measures of diluted urine ($=\frac{1000}{10}=100$ gr.-meas. of urine) required, would mean that 100 grs. of urine contains 1 gr. of sugar—*i.e.*, 1 per cent [or if 10 c.c. of Fehling decolorized by 10 c.c. of urine, since that means 0.05 gm. of sugar, this will amount to 0.5 per cent].

B. By Fermentation.

Take two samples of urine, and place in bottles, with grooved cork. Into one add a small piece of German yeast. Keep both at warm temperature for 24 hours; then decant and compare the specific gravity of each.

A loss of 1 degree of specific gravity is equivalent to 1 grain of sugar per fluid ounce of urine.

Suppose unfermented urine has specific gravity 1040, and fermented urine, specific gravity 1008. Then the quantity of sugar $=40-8=32$ grains per ounce of urine.

[This result of course only approximate.]

In all cases, calculate not only the percentage, but the total quantity of sugar eliminated in 24 hours.

The observations should be made on sample of the whole urine passed in this time.

III. Albumin.

The most accurate method, viz., precipitation, drying and weighing the precipitate too difficult for clinical estimation.

Esbach's method. A tube graduated to receive a certain quantity of urine, and so divided as to indicate, when all albumin precipitated, the total quantity of grammes (of dried albumin) per litre, or in 0.x per cent.

The precipitant employed is—

Picric acid, ...	1 part.
Citric acid, ...	2 parts.
Water, ...	100 "

This is added in definite proportion (marked on tube) and the mixture allowed to stand for 24 hours, when the height to which the deposit reaches may be read off.

[If more albumin present than indicated by the marks on the tube, which do not exceed 0.7 per cent, the urine must first be diluted with an equal bulk of water.]

MICROSCOPICAL EXAMINATION OF URINARY DEPOSITS.

Set aside urine, in conical glass, protected from dust, and when sediment well deposited remove by pipette to slide.

The deposits may be classified as (1) organic and (2) inorganic.

Organic.

1. Blood-corpuscles.—Appear mostly as clear discs or spheres; sometimes crenated, may enter urine from—

a. Kidney, as in acute congestion, acute nephritis, granular kidney (sometimes); in hemorrhage, from calculus, tubercle, cancer, or embolism. Also in purpura, scurvy, and other blood states.

b. Urinary tract, pelvis of kidney, ureter, bladder, urethra (including prostate).

c. In women, menstruation and uterine hemorrhage, may lead to admixture of blood with urine.

2. Pus-corpuscles.—As granular spheres, to which addition of acetic acid brings tripartite nucleus into view.

Source—

a. Acute nephritis.

b. Tubercular and calculous pyelitis.

c. Cystitis.

d. Gonorrhœa, urethritis.

e. Abscess bursting into urinary tract.

f. Leucorrhœa.

3. Epithelium.

a. Renal—small, rounded, granular, with large nucleus.

b. Pelvic and ureteral—tailed, pyriform.

c. Vesical and urethral—flattened, various shapes.

d. Vaginal—large, squamous.

4. Renal tube casts.

a. Epithelial.

b. Granular, fine and coarse.

c. Fatty.

d. Hyaline, large and small.

e. Blood.

f. Pus.

Most casts have a fibrinous basis; their size depends on size of tubules whence they proceed, especially whether these denuded or not of epithelial lining.

[N. B.—Do not mistake for casts: mucous coagula and filaments, hairs, cotton fibre, or scratches on the glass slide.]

5. Spermatozoa.

6. Bacteria and micrococci.

7. Bilharzia hæmatobia, ova of—oval in shape, spiked. These ova after a time may be observed to rupture, and give issue to ciliated embryos.

Inorganic.

A. In acid urine.

1. Urates of potash and soda—amorphous fine granules.

2. Uric acid—reddish-brown or yellowish crystals, of various forms—4-sided tablets, 6-sided rhombs, lozenge-shaped, or ovoid, dumb-bell, or barrel-shaped; sometimes stellate aggregations. They are invariably colored.

3. Oxalate of lime—as bright glistening small octahedra; or (more rarely) dumb-bell or ovoid.

4. Leucin—yellowish-brown, striated spheroids.

5. Tyrosin—silky, glistening, acicular crystals, in bundles.

6. Cholesterin—4-sided plates, often defective at one angle, soluble in ether.

7. Cystin—6-sided plates, insoluble in water and acetic acid, soluble in hydrochloric acid and in ammonia.

B. In alkaline urine.

1. Neutral phosphate of lime—fine amorphous granules.

2. Carbonate of lime—striated spheres.

3. Urate of ammonia—opaque, brownish-colored spheres, spiculated, sometimes dumb-bell crystals.

4. Phosphate of lime—crystals of "stellar" phosphate—*i.e.*, radiating bundles of oblong crystals (rare).

5. Phosphate of magnesia—flat elongated plates.

6. Phosphate of ammonia and magnesia, or "triple phosphate"—the usual form of phosphatic crystals in urine—large prisms with bevelled ends.

WEIGHTS AND MEASURES.

1 kilogramme	= 1,000 gm.	= 15,432.3	grains.
1 gramme		= 15.432	"
1 decigramme	= 0.1 gm.	= 1.5432	"
1 centigramme	= 0.01 "	= 0.15432	"

1 metre	= 100 centimetres	= 39.37	inches.
1 decimetre	= 10 "	= 3.9	"
1 centimetre		= 0.39	"
1 millimetre	= 0.1 cm.	= 0.039	"
[1 micromillimetre (μ)	= 0.001 mm.	= 0.0003	in.]

1 litre	= 1,000 cub. centimetres	= 16,931	minims.
1 decilitre	= 100 " "	= 1,693	"
1 centilitre	= 10 " "	= 169.3	"
1 millilitre	= 1 " "	= 16.9	"

(1 cub. centimetre of water at 40° C. weighs 1 gm.)

1 pint	= 567.9 cub. centimetres.		
1 fl. oz.	= 28.4 " "	(437.5 gr. meas.)	
1 fl. dr.	= 3.5 " "		
1 minim	= 0.059 " "		

PERCENTAGE TABLE.

The percentage of urea, sugar, etc., being determined, it is required to calculate the total quantity excreted in 24 hours. In this country the urine is generally measured in fluid ounces, each ounce being equivalent to 437.5 grains.

OUNCES.	1	2	3	4	5	6	7	8	9	10
	grs.	grs.	grs.	grs.	grs.	grs.	grs.	grs.	grs.	grs.
1 per cent.	4.375	8.75	13.125	17.5	21.875	26.25	30.625	35.	39.375	43.75
2 "	8.75	17.5	26.25	35.	43.75	52.5	61.25	70.	78.75	87.5
3 "	13.125	26.25	39.375	52.5	65.625	78.75	91.875	105.	118.125	131.25
4 "	17.5	35.	52.5	70.	87.5	105.	122.5	140.	157.5	175.
5 "	21.875	43.75	65.625	87.5	109.375	131.25	153.125	175.	196.875	218.75
6 "	26.25	52.5	78.75	105.	131.25	157.5	183.75	210.	236.25	262.5
7 "	30.625	61.25	91.875	122.5	153.125	183.75	214.375	245.	275.625	306.25
8 "	35.	70.	105.	140.	175.	210.	245.	280.	315.	350.
9 "	39.375	78.75	118.125	157.5	196.875	236.25	275.625	315.	354.375	393.75
10 "	43.75	87.5	131.25	175.	218.75	262.5	306.25	350.	393.75	437.5

EXAMPLE.—56 oz. of urine contain 2.8 per cent of urea.

2 per cent of 50 oz. = 437.5 grs.
2 " " 6 " = 52.5 "
0.8 " " 50 " = 175.0 "
0.8 " " 6 " = 21.0 "

Total 686.0 grs.

On the *metrical system*, the calculation is simpler, since 1 cubic centimetre, equivalent to 1 gramme.

EXAMPLE.—1,500 c.c. of urine contain 3.2 per cent of urea.

$15 \times 3.2 = 48$ grammes of urea.

INFLUENZA

ASSOCIATED WITH

Nervous and Mental Diseases.

BY

DR. VAN DEVENTER.

INFLUENZA ASSOCIATED WITH NERVOUS AND MENTAL DISEASES.

In the second half of December, 1889, and in January, 1890, a large number of patients in the wards for nervous diseases at the Buiten Hospital in Amsterdam were attacked by influenza.

In the majority of the cases no specially bad effect on the course of the disease was observed, with the exception of the three following cases.

In the first case death occurred, six days after the onset of the influenza, in a man æt. 50 years, who had suffered for a year and a half from hemiplegia after cerebral apoplexy, although no grave symptoms had been previously noticed, apart from irregular action of the heart.

In the second case a man æt. 36 years, who had suffered for seven years from the demented form of paralysis, died two weeks after a trifling attack of influenza, although there had been no precedent serious symptoms. This was also true of a woman æt. 41 years; she had complained for ten years of painful sensations in the head, evidently as the result of unhappy home life and bad treatment on the part of her husband, who, while drunk, had often struck her on the head. Three years ago she was greatly frightened by a lunatic who pursued her with a knife. After this the hypochondriacal form of dementia paralytica developed. On January 4th an attack of influenza developed, and subsided on January 8th without leaving any visible traces. On January 15th a relapse occurred with moderate swelling of the tonsils; violent maniacal attacks developed, but could be repressed by the administration of pieces of ice. Three days later death occurred after the development of bed-sores. On the other hand, a favorable influence was observed in the case of an hysterical girl of 9

years. This child suffered from brain disease since the first year of life, and during the last year, after a fall upon the occiput, had attacks of confusion, associated occasionally with unconsciousness. After a slight attack of influenza, these symptoms were no longer manifested, and the patient felt entirely well.

In a large number of nervous cases the influenza ran an entirely latent course, both as regards the patient and those around him.

A few cases were improperly called influenza psychoses; for example, a woman who was in the maniacal stage of dementia paralytica and in whom indisputable signs of this disease had already been noticed. In only one case of influenza, which ran its course without further complication, was delirium very prominent. This was in a man of 37 years who remained in bed only on the first day of the disease, although he felt weak on the following days. At the end of the week he again took to bed, three days later began to be delirious, and exclaimed constantly that he was falling down, that he lay in the water, etc. After he had threatened his daughter with a knife he was admitted to the Buiten Hospital. Four days later he became conscious, recognized his condition and surroundings, but denied that he had been delirious. In this case alcoholism may be excluded, as is also true of the following cases of influenza-pneumonia with delirium, at least in the first two.

In a man of 47 years, without neuropathic taint, violent delirium began three days after the development of influenza-pneumonia. The patient was extremely restless, wanted to leave the bed, and thought his money was being stolen by imaginary persons standing around his bed. On being addressed in a loud tone of voice he realized his condition for a moment. Hallucinations could not be discovered. Death occurred seventeen days after the onset of the disease, after the patient had grown weaker and the heart's action more irregular.

A woman of 21 years, with influenza-pneumonia and left pyothorax, was delirious, imagined that she flew to heaven with the rapidity of an arrow and then fell down with equal rapidity, that she became smaller and larger, and that the bed clothing was as heavy as lead and again as light as a feather.

A man of 28 years, whose father and grandfather had been drunkards and had committed suicide, but who himself had lived very temperately, especially in the last few years, was suddenly attacked by a violent influenza-pneumonia, associated with delirium. He was exceedingly frightened, said that he was in hell, and that people were annoying and torturing him; he saw animals, men, and large spectacles, wanted to drown himself or jump from the window, and often left the bed to beat his mother, whom he regarded as one of his tormentors. A week after the beginning of the disease the patient was admitted to the hospital with double pneumonia and violent fever. He was conscious of his condition and surroundings, stated that he had suffered from severe stitches in the back, and that "he then became confused but had not been delirious." Toward night he again became restless and anxious, saw snakes around his bed; a few hours later he fell asleep and on awaking was entirely conscious. Since that time no mental abnormalities were detected, the temperature became normal two days after admission, and the course of the disease was undisturbed.

A man of 50 years who had received a sabre wound on the head fifteen years before; rarely drank liquor to excess, but on account of tremor usually took whiskey in the morning on an empty stomach. The influenza-pneumonia began with herpes; the patient complained that "his head is turning around and everything is topsy-turvy." During the first four days the patient was very restless and confused, entertained the delusion that he had been robbed, that he was being mocked, and wanted to drown himself. At the end of that time his mental condition became normal, although there had been no critical sleep, but the patient denied that he had been delirious and gave wrong accounts of the course of the disease. The temperature did not become normal until two weeks later, and then the restoration to health was soon complete.

Alcoholism plays a great part in the cases of so-called influenza-psychoses. As is evident from the following cases, the disease may be the cause of alcoholic excesses, and, on the other hand, previous abuse of alcohol, whether acute or chronic, may exert an influence on the course of the disease.

In a man of 45 years who had suffered from delirium tremens three years before, but had since lived temperately,

an attack of influenza developed, associated with "delirium and voices in the head," as the patient expressed himself. He felt weak but kept himself on his legs by the aid of drink, was constantly drunk, quarrelled with his wife, and was often violent. In order to free himself from this condition, he requested admission to the hospital twenty-six days after the beginning of the disease. He was extremely weak and depressed, but soon felt restored, and was discharged cured at the end of two weeks.

A patient of 40 years with a neuropathic taint, of a violent and passionate character and addicted to drink, fell from a considerable height a year and a half ago, and remained unconscious for six hours. Since that time he complains of various sensations and a feeling of confusion, especially after drinking. Four months ago he was in the Buiten Hospital for three weeks, was very drunk at the time of admission, and exhibited the characteristic symptoms of acute hallucinatory delirium. Soon after admission he fell asleep, and then had an attack of delirium tremens which lasted a week. After his discharge the patient is said to have lived very temperately. At the end of December he felt "sore and lame," and drank four or five glasses of liquor; this was followed by alcoholic furor, and the patient, firmly bound, was brought to the Buiten Hospital. During the maniacal attack, which lasted about six hours, he cursed and raved against his wife; he then fell into a sleep, and on the following morning remembered nothing that had happened on the previous day after taking the alcoholic drinks. On admission the patient seemed to be suffering from influenza; this was shown by the subsequent course, and in two weeks he was discharged cured.

A patient of 50 years, "who could stand six glasses very well," was brought into the hospital because he was so confused. He was evidently drunk, although on the day of admission he had taken only two glasses. On closer examination he also appeared to be suffering from influenza. He was discharged cured at the end of nine days.

In the following cases delirium tremens appeared during the course of influenza:

A brewer, æt. 30 years, who was in the habit of drinking six to seven quarts of beer daily, but no hard liquor, had taken "seven to eight swallows of vegetable bitters" daily on ac-

count of anorexia and tremor. Two days after the onset of influenza he became delirious, but remained at work until the next day. On account of great agitation he was then brought to the Buiten Hospital. He said that two of his comrades were disputing concerning the payment of the last round of drinks and that he was compelled to pay the bill. He also maintained that fifty comrades were playing the flute around him and were pushing him into the air by means of a long cane which they pushed beneath the mattress through a small opening in the wall. On the fourth day of the disease a critical sleep set in, after which the patient again "felt clear in his head." During the following week he still complained of confusion and dreamed at night about his work.

In a hard drinker æt. 34 years the influenza began with delirium tremens, associated with maniacal attacks, during which it was necessary to isolate the patient. On the third day he slept about three hours; on the fourth day he slept the entire night and awoke feeling, according to his expression, sound and well. He remembered everything, and stated that he had dreamed that he was compelled to build the Eiffel Tower in twenty-four hours, that he was unable to do this because his comrades prevented him, and that he had been violent for this reason.

A cooper, æt. 36 years, who had drunk moderately during the last two years and had undergone much worry on account of his wife's illness, saw men moving about on the second day of the disease. Toward night the symptoms of delirium tremens appeared: the patient became very restless, jumped out of bed; was afraid that his brothers would poison him as they had poisoned his wife. When spoken to in a serious tone, even during the periods of greatest restlessness, he became conscious for a moment and then said: "I am not well; I am certainly crazy." Four days later he recovered after a deep sleep.

A hard drinker, æt. 40 years, who had suffered from 1883 to 1885 from convulsive attacks attended with unconsciousness, mistook, after the development of influenza, pieces of turf for kittens. On the following day he began to pack his goods because there were thieves in the house, continued this operation during the night, and finally called the police. When brought to the Buiten Hospital he showed the typical

signs of delirium tremens, and defended himself against all sorts of thieves and animals, until he fell into a deep sleep on the tenth day from the beginning of the disease. Upon awaking he felt well with the exception of "headache and a lame, tired feeling in the legs." He remembered nothing of his disease with the exception of the first day.

A saloon keeper, æt. 40 years, with a strong neuropathic taint and evidently addicted to drink, manifested the ambulatory form of delirium tremens from the fourth day of the disease until his admission to the hospital. He still served his customers, had the delusion that disguised policemen were spying upon him, and maltreated his wife several times. Upon admission he saw all kinds of animals and was constantly busy, as if serving his customers. On the following morning, after a deep sleep, he felt perfectly well and remembered all the events of the last few days.

A hard drinker, æt. 35 years, with a marked neuropathic heredity, who had had no opportunity to obtain liquor in the last six months, received from his comrades "a stiff horn" because he felt "lame and miserable." On the following day, after he had slept off his debauch, he appeared to suffer from influenza, and also saw rats, men, mountains, and policemen who pursued him with sabres. He knew that these were hallucinations because he had previously suffered from a similar attack. In dread of what might happen, he sought admission to the hospital. As soon as he closed his eyes or sat in the dark the hallucinations appeared; toward night he became frightened. On the third day of the disease he showed all the symptoms of delirium tremens. On the twelfth day, critical sleep, followed by recovery.

In a man of 46 years, with marked neuropathic taint, who could stand very little alcohol and who had been drunk occasionally during the last six months after financial losses, visual hallucinations appeared two days after the beginning of influenza. He saw a man in the garden with a pipe in his mouth, black dogs and cats, monkeys, etc. He attended to business, but during the next few days was very restless and dangerous to those around him. He maintained that his son wanted to kill him, attempted to leave the house, struck those around him, and cried murder. He also spoke of an electrical ship in which he could reach America in three days, and

ordered his horse to carry him to the vessel. The patient was admitted to the hospital on the twenty-eighth day of the disease. When left to himself all the signs of delirium tremens appeared; when spoken to he cried "Murder! help!" in the delusion that his son and brother-in-law were killing him. Two weeks after admission the patient became more quiet and two weeks later was discharged cured.

In the three following cases a fatal termination ensued:

A hard drinker, æt. 46 years, with no hereditary taint, suffered six years before from pleuro-pneumonia and two years before from erysipelas; in both cases an epileptic attack occurred two days after the beginning of the disease and was followed by delirium tremens. On the last day of December influenza developed, and on the following day the patient had two epileptic attacks and delirium tremens. He was extremely restless, a prey to terrifying hallucinations, and in an almost constant condition of furor; the heart's action was very irregular. Death occurred January 5th after constantly increasing weakness of the heart.

A saloon keeper of 39 years died under similar circumstances four days after the onset of an influenza-pneumonia. After the second day of the disease the patient believed that the police were hunting for him on account of some unknown crime; at the same time he was constantly busy, as he expressed it, "in serving his guests."

A hard drinker, æt. 54 years, with diffuse nephritis, suffered from delirium tremens after the first day of an influenza-pneumonia; it lasted about two weeks. He threw everything that came into his hands at his imaginary persecutors. In the next few days he was delirious at night, but no psychical abnormalities were noticed during the day. He died six weeks from the beginning of the disease, evidently as the result of the renal affection.

In all these cases hallucinations of the different senses could be produced with ease, and the patient was very dangerous to those around him, at least at the height of the disease.

Symptoms of hysteria were also observed with the occurrence of influenza. The first case was seen in a nervous boy of four years with neuropathic heredity. Repeated hysterical attacks occurred for two weeks after the onset of influenza.

A boy, æt. 10 years, who had suffered formerly from chorea,

began to go out on the fifth day after the beginning of the influenza, although he still coughed constantly and complained of pains in the head and legs. Four days later he complained suddenly of a dull noise and pain in the head, became pale, fell over backward, became unconscious, and tonic and clonic convulsions developed throughout the body. Next the patient turned several times around his own axis, protruded the tongue as far as possible, then folded his hands upon the chest, opened his eyes and said, "I am feeling better." Such attacks occurred several times during the first two weeks. After the seizures the patient was very sensitive to impressions on the special senses; he was irritable and violent. A week later choreiform movements appeared, especially on stretching out the hand.

A patient, æt. 39 years, of feeble constitution, and who, when overworked, exhibited symptoms of hysteria during the last few years, suffered on the third day after the onset of influenza from a complete hysterical aura accompanied by vertigo and roaring in the head. These attacks occurred three times on this day, twice a day on the next two days, and then no further symptoms were noticed.

A nervous girl, æt. 13 years, with an hereditary predisposition, stated, without reason, at the beginning of the influenza that she had swallowed two needles. The tonsils were much swollen. In the first few days mild hysterical attacks occurred, terminating in laughing or crying. They could be checked at once by pressing upon any part of the body and saying at the same time that the attack should cease. Mild choreiform movements were also present in this case, but they disappeared very quickly.

A woman, æt. 28 years, who had suffered from "attacks" for the last four years as the result of a violent fright, passed through an attack of influenza in the Buiten Hospital without any noticeable sequelæ. Three weeks later there was a relapse, followed in two days by a violent hysterical seizure (for the first time in six months), attended with biting of the pillow, rotation around her own axis, and jumping into the air. Such attacks occurred repeatedly during the first three days.

An hysterical and neurasthenic patient, æt. 40 years, became very quarrelsome during the latent course of influenza,

argued constantly, and maintained falsely that one of the other patients had given her a blow in the back. A week later she was again quiet, and stated that during her influenza her entire system had been in confusion, and that for this reason alone had she been so disagreeable.

Under the influence of influenza an hysterical woman of 56 years began to rave and scream violently and to find fault with everything and everybody. As an excuse the patient, who did not know that she was suffering from influenza, said that "her nerves had gotten the upper hand." At the end of two weeks the symptoms gradually subsided and have not reappeared since.

An especially noteworthy phenomenon is the influence excited by influenza upon the occurrence of epileptic attacks.

A patient, æt. 23 years, had suffered from earliest childhood, until three years ago, from attacks of mental confusion, during which he undressed himself and ran about as if looking for something. After an epileptic seizure in the street he was admitted to the hospital, where he was attacked by influenza, associated with extensive urticaria, including the face. He had felt sick the day before, and then had a similar epileptic attack which he did not remember. A week later he felt entirely well.

A patient, æt. 36 years, with slight asymmetry of the face, had occasional epileptic vertigo, and for the last three months after carrying a heavy load on the head suffered from headache. In the morning, before going to work, he had a violent epileptic fit. Consciousness was restored six hours later, and he then appeared to be suffering from influenza, associated with tic douloureux. He did not remember that he had had an attack or what had happened in the last few hours. On the following day he was perfectly conscious, and stated that on the previous day he had been in constant fear that the house would tumble down.

In a drunkard, æt. 41 years, the influenza also began with an epileptic attack, which was soon followed by a second one.

A strong man, æt. 40 years, after his recovery from influenza, suddenly stood still in a hall, gazed fixedly in one direction, turned around three times, and then had a violent epileptic fit.

In the two last-mentioned cases the patients are said never

to have suffered from similar attacks. In the former this seems doubtful; in the latter we have only the statements of the patient and his wife, who would be apt to conceal the existence of epilepsy.

In a woman, æt. 22 years, the influenza also began with a characteristic epileptic attack. She was peculiar in her ways, was irritable after exertion, and dreamed a good deal. There was no neuropathic history and the patient had never suffered from nervous attacks.

A patient, æt. 23 years, who had the first attack six months ago, felt tired and miserable all morning. Toward noon she suddenly fell and had a convulsion; afterward she was quite stupid and very annoying to those around during the next few days.

These cases show clearly the effect exercised by influenza upon the mind. In this respect the following cases of melancholia are extremely instructive:

A boy, æt. [illegible] years, with an hereditary predisposition, was scolded by his father a week after the onset of influenza. This hurt the boy and, as he expressed it, "stuck in his throat," so that he became confused and depressed. In his fear he constantly clutched his throat, beat himself upon the head, wanted to hang himself with a handkerchief, and cried, "I want to die." Two days later he saw men with knives and daggers who wanted to murder him. [illegible] days later he was admitted to the hospital, and was placed at once into a separate room. He complained constantly that it was disagreeable to him to be alone, but about six hours later stated that the feeling of anxiety in the throat had left and that he felt as cheerful now as he had been miserable before."

A woman, æt. [illegible] years, with a nervous heredity, was very unfortunate in her marriage [illegible]

also hung herself, but was rescued. She was a prey to the most terrible fear—said that there was no salvation for her, saw policemen who were about to arrest her, judges to sentence her, and persisted that the workmen attempted to poison her. Hereupon she confessed her infidelity to her husband, who forgave everything. January 18th she was admitted to the hospital and, like the previous patient, taken to a separate room. After a conversation with her on the following morning her fears disappeared almost at once, and she again felt entirely well, apart from a feeling of weakness.

Both these cases are typical examples of melancholia.

This is also true of the following case, in which melancholia apparently developed spontaneously on the day after the onset of influenza. The patient was 22 years old, with a neuropathic heredity, but otherwise perfectly healthy. During the first night he complained of insomnia and anxiety, so that he often arose. He then said: "I must die; I am a sinner for whom there is no grace; I have blasphemed Jesus, killed my brother and grandfather [who were long since dead], and must burn forever in hell." He was often a prey to the most violent fear and despair. He said on several occasions: "The disease is in my soul; my head, heart, and soul are full of ulcers." Four weeks after the beginning of the disease he became more quiet, but remained depressed from the delusion that he had committed a sin.

In this patient, as in the two preceding ones, there were insomnia, anorexia, constipation, coldness and cyanosis of the limbs. The following complicated case is also noteworthy in regard to the short duration of the melancholia:

A patient, æt. 43 years, with a neuropathic family history, had suffered from "absences" once or twice a year for the last twenty years; in 1888 he had an affection of the eyes, associated with general tremor and constant noises in the head. Two days after the onset of his influenza he gradually became depressed, quiet, and tired of life. Twelve days later he said he was worse than an animal and threatened to murder his family. On the following day he hung himself, but was rescued and sent to the Buiten Hospital. The patient remembered that he had been low-spirited for the past few days, but not that he had attempted suicide, and showed no further symptoms beyond those which had been present before the influenza.

In the following case the influenza was evidently merely the last straw that broke the camel's back:

A patient of 27 years, with a neuropathic predisposition, of limited intelligence, violent and obstinate, believed from earliest childhood that he had been neglected. Two days after the onset of influenza, with high fever, he began to be delirious, was frightened and depressed, and stated that a man with a sharp cane would come to beat out his brains; there were occasional violent attacks of furor. Four days later he attempted to cut his radials, found the appearance of the blood pleasing, and the bandaging of the wound caused no pain. He then jumped into the garden from a height of eight feet and was afterward taken to the hospital. During treatment he was depressed, asked everybody's pardon, and wished himself dead. He accused himself of the queerest crimes, stated that he was punished by electrical currents, dogs, lions, and tigers.

The following case may also be mentioned in this place:

A patient, æt. 57 years, who had suffered since puberty from hypochondriasis, which, as a rule, he could conceal, expressed the most varied complaints after he had been in bed three weeks with influenza. A week before his wife had died of influenza. Two days later he suddenly saw a female figure in a long black cloak, beneath which his wife was concealed. He heard her voice distinctly. On the following day the patient entered the Buiten Hospital in the hope of being reunited to his wife. In about a week this delusion subsided, but the hypochondriacal complaints only ceased after improvement in the general nutritive condition.

Of the following cases of mania only the first may be called a pure influenza-psychosis. In the second one there had been previously a violent mental emotion.

A girl of 20 years, with neuropathic heredity and of a quite irritable, obstinate character, began, two weeks after the onset of influenza, to talk constantly, to sing and speak in verse; she often shook with laughter, made faces, and imitated the movements and words of others. She said that she had a wild enjoyment, was cheerful and happy. She would play with her shadow for hours, and if interfered with often had violent attacks of anger. Seven weeks after the outbreak of the mania the patient was discharged cured.

The second case occurred in a girl of 16 years who had already had four attacks of periodical mania (each time during menstruation); the first attack had developed on the day after a man had entered her sleeping-room. A few days after the last menstrual attack a similar attack of cheerful mania developed in combination with influenza.

A man, æt. 49 years, with neuropathic heredity, had experienced financial losses a short time ago. Ten days after the outbreak of influenza, from which he seemed to have recovered, he suddenly began to sing and dance, and spoke incoherently, at first concerning his losses. In the first few days he opened the window to jump out and took a revolver to shoot himself. The patient said, however, that he merely wished to greet the people on the street and to conceal the revolver. He was always cheerful, constantly moving about, clapped his hands, and drummed with a cane upon the bedstead. It was only after the lapse of two months that the patient was discharged cured. Acute hallucinatory confusion was observed in one case, a woman of 65 years, who had had a puerperal psychosis forty-six years before, after the death of her first child. Otherwise she had been well, bodily and mentally, but had a violent temper. The patient had gotten up a week after the onset of influenza, but then had to return to bed, suffered from insomnia, and, three days later, began to talk very rapidly. At the end of two days she spoke incoherently, sang lullabies, rocked a package which she called her baby, and, as her family said, exhibited the same symptoms as forty-six years before. During the further course of the disease she was very restless, often raving, suffered from echolalia and various hallucinations, and was extremely confused. Her moods depended upon the various delusions and the most prominent hallucinations. She was very feeble and pale. Eighteen days after the beginning of the disease she recognized her condition, said that "she had been restless in her head, and had had bad dreams which she did not understand." Two days later she was entirely normal, and stated that a fire which she had seen in the neighborhood had existed only in her imagination.

Only one case of monomania was observed, in a patient of 31 years, with a neuropathic history on the maternal side. He had a passionate temperament, could stand very little alcohol, became boisterous over trivial matters, and "acted as if he

saw or heard something" without remembering it afterward. Visual hallucinations suddenly developed eleven days after the onset of influenza. For a few days before he had had a pale, depressed appearance. At night he became very excited and asked for the minister in order that he might receive communion. On the following day he wanted to go to church, and often jumped out of bed. Two days after the beginning of the disease he was admitted to the hospital and announced that he had read in the Gospel of Luke that "the light shines in the darkness." This refers to him who has suffered so much, and was a revelation that he and his wife would beget St. John, and that from his the patient's eyesight would proceed the light that would spread over the world. God had sent him the disease as a test, but sorrow was followed by joy. The patient furnished a good clinical history, suffered from visual and auditory hallucinations, and under their influence was often restless and dangerous, because he often became suspicious of one or the other patient.

It is evident from the foregoing cases that the favorable or unfavorable influence which is said to be exercised by influenza upon an existing nervous disease is more apparent than real. Experience teaches that such a favorable or unfavorable termination may be observed without this causal factor. In non-complicated cases delirium was prominent in extremely rare instances, despite the large number of influenza patients who were treated in the State Hospital.

The experience gained in this hospital does not justify us in speaking of an encephalitic form of influenza. Delirium is observed not infrequently in pneumonia, while acute symptoms of cerebral embolism occur in the most varied diseases. A notable feature is the frequency of chorea, and to a less extent of hysteria which were observed in connection with influenza. And in cases in which previous nervous ailments could be positively excluded. But even in such cases a few characteristic symptoms point to a predisposition. A similar predisposition must also be assumed very probably in the foregoing cases of mental disturbance.

We have intentionally excluded those cases in which no direct relation could be established between the influenza and the subsequent insanity.

The writer has treated a number of patients who stated

only after direct question that they had suffered from an attack of influenza and even a relapse, and complained since then of weakness, general malaise, mental weakness, irritability, anxiety, and insomnia.

In these cases, also, the prognosis seems to be favorable when the patient is brought into better surroundings, his nutrition improved, and no other etiological factors come into play. The unfavorable course of many cases seems to be due to the original bad surroundings. When these can be corrected a favorable prognosis may also be given in cases of chronic alcoholism. In uncomplicated cases the course of the disease is very acute. In a case which was not reported here an attack of transitory melancholia lasted only eight hours and ended in a quiet sleep, from which the patient awoke "as usual." The good result was obtained by complete psychical and bodily rest and cheering admonitions.

A large number of the reported cases show the necessity of having in every hospital a ward for patients suffering from acute psychoses. Admission to a lunatic asylum is not desirable, both on account of the short duration of the disease and the bad effects of the transportation, inasmuch as the heart's action is irregular and insufficient in many instances.

TECHNIC OF LING'S SYSTEM

OF

MANUAL TREATMENT

AS

APPLICABLE TO SURGERY AND MEDICINE.

BY

ARVID KELLGREN, M.D. (EDIN.)

TECHNIC OF LING'S SYSTEM OF MANUAL TREATMENT.

CHAPTER I.

INTRODUCTION.

THE following pages are intended to serve as a guide to the student, and to set more clearly before the minds of readers the curative uses to which Ling's system of manual treatment may be applied. They mainly consist of sixteen demonstrations which were given by me at Pola during the winter of 1888–89. These lectures were delivered at the request of the surgeons of the Imperial and Royal Austro-Hungarian Navy, and also of the surgeons of the land forces stationed at Pola. Numerous illustrations have been added, in order to render more clear the directions in the text; and it is hoped that the work may prove not only of interest, but of practical utility, in the study of this form of medical treatment.

It is now more than eighty years since the idea of curing diseases by well-regulated movements first occurred to the Swede, Peter Henrik Ling.

P. He. Ling was born in the year 1776. His father was a Protestant minister. He went through the usual course of training preparatory to entering the university, where, in accordance with his parents' desire, he took up the study of divinity. The tendency of Ling's character, however, disposed him to a more active life, and as soon as he was free to follow his own inclinations, he started travelling on the Continent.

Very little is known about him during his wanderings. Certain it is that he returned home well versed in foreign languages, and a perfect master of the art of fencing; but also, in consequence of the hardships he had undergone, with a

shattered constitution. This, however, did not prevent him from following his favorite pursuits, and we thus find him at the beginning of the century working hard at gymnastics and fencing.

Ling gradually regained his health, and on his appointment, in 1804, to the post of fencing master at the University of Lund he was a strong and wiry man. He rightly attributed the change to the gymnastic exercises he had taken; and he further drew the conclusion that what had been good for him would also be good for others, and that it ought to be possible to devise movements which would be particularly beneficial for invalids.

He was a man of indomitable energy, the whole of which he brought to bear on the carrying out of these plans. The professors of medicine at the University of Lund were friends of his, and he endeavored to interest them in his ideas, and succeeded to a certain extent in so doing. They opened their anatomy and other lecture-rooms to him, and helped him in many ways. The "fencing master," as some of the continental writers on massage, the majority of whom know nothing whatever of his treatment, are so fond of calling him, learned everything that could in those days be learned in the different departments of medical study.

By utilizing and developing many of the gymnastic movements practised by former men, and by devising for himself many new ones, he built up a system of exercises—the Ling system. He studied their effect, and endeavored to explain it on physiological grounds. As we cannot always explain the action of many drugs, so he was unable to explain why certain exercises produced corresponding results. He was in these cases guided by the law of the beautiful, and reasoned that any exercise or movement which in itself was graceful, would also be beneficial.

He divided his system into four chief branches:

1. The pedagogic.
2. The medical.
3. The military.
4. The aesthetic.

I only intend in this thesis to deal more particularly with the second group, but I may say that the "pedagogic" exercises are for the developing and strengthening of healthy

people, while the "medical" are meant to arrest or combat diseased conditions.

These two, however, pass so gradually into one another that no distinct line can be drawn between them; and it is therefore essential to know both, in order to be able to use the medical part of the system properly for the purpose assigned to it.

Being anxious to found a gymnastic institution, Ling applied for help to the government, but the Minister of State to whom he addressed himself replied, "We have enough of jugglers and dancers on wires without also subsidizing them by the state." But in the year 1812 his efforts were crowned with success, and the government of Sweden founded "The Royal Central Gymnastic Institution" in Stockholm, with Ling as its chief.

Here regular courses of lectures on anatomy and physiology were given, the pedagogic and medical gymnastics taught, together with fencing in all its branches. No pupil was allowed to enter the institution who had not passed the university entrance examination, which corresponds to the "Abiturienten Examen" in Germany. At the present time a nine-months' course of instruction is given each year, viz., from the 1st September to the 15th of May.

When Ling died, on the 3d of May, 1839, he left to his country, that numbers him among her greatest sons, in the form of his system of exercises, a legacy by which thousands have regained their health, and by which, thanks to the pedagogic portion, there still lives in Sweden a strong and healthy people.

The path, however, of this new method was not a smooth one, for so soon as the effect of the treatment began to show itself, the Swedish medical profession did everything in their power to prevent its further progress. At first they tried to kill the system by silence or assailed it with sarcasm, but finding these means useless, in the face of cures resulting from its application, they began an active resistance.

Those, however, who advocated the system—and among them, proving exceptions to the general rule, were several medical men—were by far too enthusiastic in favor of the treatment to be easily frightened from what they considered the right path.

When I spent the years 1877–79 in the institution, only a two-years' course was necessary in order to obtain a diploma, but in the year 1888 the rule was made that a three-years' course should be imperative. The concluding year is entirely devoted to attendance at lectures on diseases, to clinics, and to the application of the various movements to the patients undergoing treatment. The latter are of two classes—those in the morning being paying patients, while in the afternoon the poor are gratuitously treated. This valuable and necessary extension of time is due to the present chief of the institution, Professor L. M. Torngren, Professor Hartelius, and the other masters, who for over six years have strenuously advocated the acceptance of this rule by the Swedish Medical Council.

It is supposed by many that what nowadays goes under the name of massage is one thing and Ling's system is another. This is an entire mistake, for the massage manipulations are only a few of the passive movements contained in Ling's system. That this is the case, any one may see for himself, if he will read what Ling and his immediate successors have written. It is, on the other hand, quite true that the medical profession in Sweden, disregarding their own native institution, have "gone over the river to fetch water," and have learnt the massage movement from Metzger or his pupils.

I should also wish to state that I have not studied any part of the treatment under any one but my own masters in the Royal Central Institution at Stockholm, and my brother, Mr. Henrik Kellgren, under whom I worked more or less during the years 1876 to 1886. Neither have I read all the writings on massage and Ling's system ("Schwedische Heilgymnastik") which are everywhere cropping up on the Continent. But the little of these authors that I have read, and the figures I have seen in their books purporting to be true illustrations of Ling's exercises, are in most cases incorrect.

Another impression derived from these books is, that the authors, if they have ever been in Stockholm, must have been there during the summer, when the institution is closed, or at any rate have stayed there too short a time to learn anything.

Let me also state, that part of what I describe—*i.e.*, most of the shakings, nearly all the vibrations and the nerve vibra-

tions—are not part of Ling's original system, but have been added by my brother, Mr. Henrik Kellgren, who was a pupil under Ling junior.

It is hardly necessary to add, that we who advocate Ling's system such as he taught it, do not use any machines for producing the movements. We certainly have apparatus, if I may so call it, on or beside which the patient may take up certain positions which enable us to give the exercises where we wish, and as we wish. Machines cannot possibly do the work of the human hand, which has the brain controlling it. If the machine could feel and think, it might be otherwise. The condition of the patient varies from day to day, and so must the treatment. This can be readily done when we use our hands, but not when machines are employed. Professor Branting, the greatest of all the pupils of Ling senior, speaking of the machines, said, "De representera hedendomen i gymnastiken"—"they represent the heathen times of the treatment." I readily admit it is more comfortable to do the work with the machines, but as the patient should be our first consideration, I have no hesitation in saying that no machines will produce results comparable with manual exercises properly applied.

It is generally considered that the manual treatment is quiet inapplicable for acute inflammation of the joints and other parts. This commonly entertained belief is a complete mistake. Certainly, if we rely only on the ordinary massage movements in these acute conditions, we can do little good, and probably will do harm; but in vibrations and nerve frictions, we possess a strong weapon with which to combat these acute diseases. The difficulty lies in the application of these vibrations, for if they are given with an unskilled hand, the effect is frequently not beneficial; but this fact can scarcely be quoted as an argument against their use, or the treatment itself. Among the cases which I append, it will be found that I mention examples of acute inflammation, such as diphtheria, tonsillitis, parotitis, recent fractures, etc., which were treated at once.

In giving the massage manipulations, I never use oil or ointment of any kind. The dry massage is cleaner, it affords a better and more certain feeling to the hand, the movements are steadier, and it is seldom necessary to expose the patient's

body, except occasionally for purposes of examination. For example, in pétrissage of the abdomen, a linen or silk garment intervenes between the hand of the manipulator and the skin of the patient.

It should be added that mere theoretical teaching will never train any one to give the exercises properly. To gain complete mastery of the movements necessitates several years of careful work, as seen from the fact that the course at Stockholm has been extended to three years. Moreover, a special aptitude is required for the treatment, which even long experience will not create—just as one man may bring to the practice of operative surgery a neatness and dexterity of handling which others may work for years without being able to acquire. The treatment, in short, is one that cannot lightly be taken up in connection with other forms of medical work, but should either be exclusively practised or left alone.

The medical part of Ling's system is divided into

I. Passive Movements.

A passive movement is one which is executed on the patient, or with a part of him, he himself being entirely at rest.

The passive movements are as follows:

1. Effleurage.
2. Pétrissage.
3. Tapotement.
4. Massage à friction.
5. Rolling and shaking of the muscles.
6. Shakings.
7. Vibrations.
8. Nerve vibrations.
9. Passive extension of muscles.
10. Other passive movements, such as rolling, extension and flexion, etc., at the different joints.

II. Active Movements.

A movement is called active when the patient himself takes a working part in it.

The active movements are divided into—

1. Free, *i.e.*, movements executed by the patient without any external help whatever.

2. Bound, *i.e.*, movements made either while steadiness and isolation are secured by apparatus, or under resistance.

Those made under resistance are again subdivided into—

(α) Those in which the patient resists.

(β) Those in which the operator resists.

CHAPTER II.

PASSIVE MOVEMENTS.

THROUGH the passive movements we act more or less directly on the part or organ which is to be subjected to treatment. Acting more particularly on the venous and lymphatic circulation, they must all be made in the direction of those currents. They all have a common physiological effect, viz., of causing resorption.

Some of the passive exercises which are executed with a part of the patient's body, approach in their character the active movements—as, for instance, the rolling of a limb, such as the arm, when we quickly rotate it at the shoulder-joint.

EFFLEURAGE.

Effleurage is a stroking movement in the direction of the heart, the object being to act more particularly on the venous and lymphatic circulation in superficial parts, such as the skin, subcutaneous tissues, etc.

The effleurage may be very superficial or deep—in other words, the pressure may vary from the lightest touch to one of considerable force; but this force must be gradually increasing as it passes toward freer and healthier parts, and should not be applied with vigor from the outset.

The superficial form of effleurage is intended to soothe pain by its action on the endings of the sensory nerves in the skin, while the deeper has for its purpose the onward passage of fluids. In any case, both forms must, according to my opinion, be made slowly. If the hand is passed quickly over the skin, heat and redness of the surface are caused. The operator has thus produced hyperæmia of the skin, *i.e.*, drawn the blood to the distal side say of an effusion—and that is

certainly a very questionable advantage. Besides, in the deep effleurage it gives the patient more pain.

If the effleurage is only superficial, one ought to begin at the extremity of the limb; when it is deep, however, a commencement should be made somewhat higher than the upper border of the swelling.

Take, for instance, effleurage of the right forearm when effusions are present (Fig. 1).

The patient rests his arm on a table, and the operator steadies it still more by grasping the wrist with his left hand. He then, with the radial border of his right hand forward, makes a stroking movement from below upward, beginning at

Fig. 1.

first above the effusion and gradually coming down, allowing each individual stroke to have its normal direction.

The effleurage ought to begin higher up than the exudation extends, in order to stimulate the tissues above to brisker activity, and it must be carried step by step downward, because the amount of exudation which is driven forward is of course far less than it would be if one started at the extremity of the limb. The consequence of this, again, is, that more force can be used, less pain is caused to the patient, and the resorption is quicker.

The operator should be careful to hold his own arm as nearly as possible parallel to that of the patient. The manipulation is thus easier to give, and is less hard, as every bending in the wrist-joint causes more stiffness in it, greater pressure

on the part worked on, and also changes the direction of the force.

The part of the hand with which to work depends on the portion of the body to be acted on, and the cause. For instance, round the ankle, or for thickening of a tendon, the first phalanx of the thumb or the fingers is used, but not in such a pointed manner as is generally shown in diagrams.

For my own part, I never give effleurage first, but invariably precede it with some other movement, such, for example, as pétrissage. Most operators, on the contrary, usually begin with it. There are, I understand, even those who, as a preparation, for several days limit their treatment to this movement alone, and that only round the affected part, if it be painful, as in a distortion. That is to say, the exudation is allowed to settle, and the pain caused by it at the beginning is not relieved. Such a procedure is simply a waste of time. I have given pétrissage and effleurage at once in fresh distortions, dislocations, fractures of the fibula, radius, and round the elbow, and I have never had the slightest reason to regret this method.

To give effleurage for neuralgic pains is a still greater error, because there are other easier and more effective manipulations suited to the cure—I mean nerve vibrations.

Whenever effleurage is given in any affection where the slightest movement produces pain, one hand must be used to steady the part. In fact, I invariably make it a rule to do this even when there is no pain. It gives me greater command over the limb, and the manipulation is more accurate.

I have seen diagrams showing effleurage of the throat. There has been, according to my judgment, one common mistake in them, viz., the leaning back of the head. The movement, I suppose, is to have its effect by the centripetal pressure produced on the vena jugularis interna. But if we look at the anatomical arrangement of the parts, we shall find that the sterno-cleido-mastoid and omohyoid muscles cross the vein, and must also produce their pressure when the head is thrown back. If anything is to be avoided it is decidedly positions which in themselves hinder the venous circulation—much more so then, when, as in the present case, they are entirely unnecessary, since the completely erect position is the correct one.

As regards the duration of effleurage, this depends on the cause of treatment. I am quite unable to offer an opinion as to how long effleurage should be given in order to lull pain alone, because I always use nerve vibrations. Under other circumstances, I prefer a few slow, strong, and deep strokes to any number of light and quick ones.

CHAPTER III.

PÉTRISSAGE.

PÉTRISSAGE is a kneading movement, by which the skin, subcutaneous tissues, and more particularly muscles, are acted upon.

The muscle, or part of it, is grasped slowly between the thumb and the other fingers, and rolled slowly between them, in very much the same manner as one rolls a pencil, the pressure sometimes increasing, sometimes diminishing, care being taken that the joints of the fingers and wrist are kept loose. A stiff wrist impedes the free motion of the fingers, and excludes the elasticity in them.

It is of importance in all forms of pétrissage, that the skin under the fingers should move with them, as the manipulation otherwise is somewhat uncertain and less effective. If we treat, for instance, such cases as erysipelas and frost-bite, and allow the fingers to move on the surface of the skin, these complaints are greatly intensified; while, when the manipulations are made correctly, the patients quickly recover. A short time ago I was called to a patient, a lady about thirty-eight years old, whose left ear had been attacked by erysipelas. She had felt somewhat feverish for a few days, and on the night preceding my call the illness had broken out. The ear was greatly swollen, the skin felt hard, tense, and infiltrated, and had an intensely red coloration; pain was present, and it increased on touch. The swelling and redness extended down on the throat for about two inches, and forward over the parotid region of the face; the lymphatic glands on the left side of the throat were enlarged. Fever and headache were also present.

Locally, I gave mostly pétrissage, in addition to some general treatment for the head and body. After two days the ear had its normal color and proportions, the skin peeled off, and the swelling on the face and neck were gone. For

some days afterward the patient had a feeling of prickling and slight heat when the face and ear were washed.

The masseur can easily know if he has broken through the rule of not working with a stiff wrist and fingers, if the skin

FIG. 2.

has been reddened more than from ordinary pressure, the redness of the latter being less intense, and disappearing more quickly. It seems scarcely necessary to state that the

FIG. 3.

pressure should gradually increase in strength, but, as I have frequently seen mistakes of this kind made, I mention it.

The pétrissage to the muscles may be applied with one or with two hands, as shown in Figs. 2 and 3.

The manipulation with one hand hardly needs any further explanation, but with two hands it is more complicated. The muscle is rolled as before described, but it is also stretched by the backward movement of the fingers of one hand, while the thumb of the other passes forward. In Fig. 3 we also see that at the conclusion of the movement, the fingers of the hand moving forward and the thumb of the other one are only lightly in contact with the skin, and do not exert any pressure. If they did, we should have a constant pressure, less stretching of the muscle, and the stream of the fluids in the muscle would be interrupted; while, in addition, the skin would be strained in a way that would be very uncomfortable for the

Fig. 4

patient. Care must be taken that the very tips of the fingers are not used, but at least the last phalanx as a whole and the anterior part of the second one as well. The use of the tips of the fingers and the thumb has been one of the commonest faults I have met with. One cannot work with the tips without strongly bending the fingers, which has the effect of stiffening them and the wrist. The softness in the movement becomes lost, the patient strains and contracts the muscle from the pain produced (*e.g.*, in rheumatism, and even if there is no acute disorder), and the work becomes only superficial.

In giving pétrissage of a muscle, we ought always to begin at its proximal end, and gradually pass downward. Here, as in effleurage, we must take care, that each kneading has a

direction upward. This is easily produced by a slight twisting of the hand.

When effusions arising from sprains, dislocations, or fractures are treated with pétrissage, I work with the whole of the thumb down to its thenar part. I start above the effusion.

In order to obtain a larger and freer range of motion, the thumb is put down a little above the place to be subjected to manipulation, and carried back to the particular area to be treated. If this precaution is not taken, the skin becomes stretched and irritated by the onward movement of the thumb. The thumb describes a half circle, with gradually increasing pressure as long as it moves in the centripetal direction, then

Fig. 5.

the pressure is relaxed, the thumb is lightly moved back to the starting-place, and the same action repeated. The movement should be given slowly and deliberately.

In the gluteal region the manipulation is made with the lightly-closed hand, and has the direction toward the sacrum. The patient can then bear the treatment much easier, and will allow it to go deeper.

The patient must always be placed in such a position that the muscles to be worked at are relaxed. Thus, in pétrissage for the gluteal region, he lies face downward, with the leg of the affected side crossed over the other, as in Fig. 5. He is not to stand bent forward, as is sometimes shown in illustrations, because the muscles are then more or less passively

extended, and prevent the proper application of the treatment.

In cases of incomplete fracture, or when the exudation is too great, gentle pétrissage with the first phalanx of the thumb enables one to come down to the seat of the injury, and thus aids to form a correct diagnosis.

When I treat effusion by pétrissage, I either pass over the whole of it two or three times, afterward making some strokes of deep effleurage, or I make one single stroke each time before moving the hand lower down.

The length of time to give pétrissage must of course vary with the case we are treating, it being necessary to apply it for some time in effusions and more serious complaints, while for simple stimulation of the muscles only a few minutes are necessary.

General Pétrissage of the Abdomen.

The position in which general or partial pétrissage of the abdomen is to be administered to the patient, is the recumbent

Fig. 6.

one shown in Fig. 6. It has for its object the relaxation of the abdominal muscles. The hands are folded behind the neck, in order to promote freer respiration. The patient is not allowed to lift the head up, because then the abdominal muscles at once contract, as any one may see for himself by lying down and raising the head. This result is very natural. The muscles which lift the head have their steady attachment on

the thorax, and in order that this may be able to act as a point of leverage, it must itself be steadied by the abdominal muscles.

In general pétrissage of the abdomen, the whole of the palmar surface of the hand is in contact with the abdominal wall. The hand is spread out over it, the fingers lying to the left in the interval between the lower ribs and the iliac crest, but somewhat nearer the former, while the thumb has the same position on the right side, and the base of the hand is a little above the pubic arch, with the strongest part, the ball of the thumb, near the right iliac fossa.

As this manipulation and others of the abdomen are never

Fig. 7.

given on the bare body, it is of the highest importance that the part of the abdominal wall under the hand should follow it in its movements, otherwise irritation of the skin is caused. In order to decrease the possibility of this, the dress nearest to the skin ought not to consist of wool, but should be made of silk or linen. It is also clear that if the hand moves over the surface of the abdomen, the intestines are not acted upon, or only very slightly. It is of the utmost importance that the hand works firmly and yet softly, that there is no stiffness in any joint, and that the forearm is kept as nearly as possible parallel to the patient's body.

The movement itself has a circular character, and is generally started from below with the base of the hand. This, with slight extension (dorsal flexion) at the wrist, passes under

soft, gradually-increasing pressure to the right into the iliac fossa, and then upward in the line of the ascending colon. It is natural that the thumb is brought higher up and comes to lie close under the ribs over the hepatic flexure. The hand now moves, always in contact with the abdominal wall, and continuing its slightly circular way to the left, the thumb and the thenar part of the hand having overtaken the work. It is not enough to move the hand over; it is also pronated a little at the same time, and the thumb is adducted toward the fingers. These again, as the hand passes to the left, come over the splenic flexure, and in their turn become the principal agents. They move downward, bending more and more at the metacarpo-phalangeal joints, not at the phalangeal ones, and with a slight flexion at the wrist. As the hand passes lower and lower down close beside the os ilium, it is somewhat supinated, and when the wrist is again near the pubic arch, the base of the hand again takes up the work.

These manipulations, although described separately, do not exactly follow each other, but one begins a little before the other has ended, and in this manner the kneading is produced. If this were not done, there would, of course, only be pressure in one direction after the other.

From the wide extent of the movement, we see that the whole of the intestine becomes rolled and kneaded, the circulatory activity is increased, and this carries with it increased absorption and secretion, and also increased peristaltic action of the intestine. We can also understand that it must have a great influence on the circulation in general, because of the large number of blood-vessels contained in the abdomen.

I have described this general pétrissage of the abdomen as practised by my brother, Mr. Henrik Kellgren. He nearly always gives it for some minutes, as the final movement of a day's treatment, because he has found that it greatly increases the quickness of recovery. The movement is very difficult, and, indeed, nearly impossible to describe well, but is also as difficult and as impossible to give for any one who has not been gifted by nature with a good hand for the treatment, and it is necessary both to see and still more to feel it.

It is tiresome at first for beginners, or when given often, and the fatigue is especially felt in the small muscles of the thumb. Much relief, however, may be derived by placing the

fingers of the left hand on the thumb in such a manner that the tip of the long finger is over the phalangeal joint, and those of the fore and ring fingers respectively on the first and second phalanx.

Nearly all the organs in the abdominal cavity may separately come in for treatment. I will only describe special pétrissage for the colon and rectum, the kidneys, and above the pubic arch.

For the Colon and Rectum.

Pétrissage is here mostly given for constipation. There are especially two places to which our attention must be

Fig. 8.

directed, viz., the sigmoid flexure of the colon and the splenic flexure of the colon. We begin the movement as far down in the pelvis as possible, and gradually pass upward. Each individual kneading always goes from above downward in the line of the intestine. . The fingers are to be flexed only at the metacarpo-phalangeal joint, because if the fingers are bent the manipulation becomes pointed and painful, we cannot get down deep enough, and the kneading character is lost. As illustrative of this treatment, I may mention a case of constipation in a baby between three and four weeks old, which I had under my care while staying with a friend in Sweden last autumn. For two days medical applications had been tried, when I suggested to my friend, that his baby would not get

well until I had given it some pétrissage of the abdomen. He gave me a look that clearly indicated that he was not likely to allow me to try anything of that kind. As the baby's condition on the third evening had not changed for the better, and all the medical resources at my friend's disposal, down to soap suppositories, were at an end, his aversion to my proposal passed away, and he even asked me to do what I could. I simply gave light pétrissage of the descending colon for about one minute, without the child making the slightest sound; but I dare say it would have been different, if I had bent my fingers and worked more with their tips. The bowels acted very well during the night, and no further treatment was necessary.

The left hand is often used to support the right, and then the tips of its fingers are placed on the last phalangeal joint, and its palmar surface close to the back of the right hand.

For the Kidneys.

We generally treat both at the same time. The abdominal wall must be very relaxed, as we need to bring the hand deep down before the manipulation can be begun.

The knees are bent somewhat more than in Fig. 6. The

Fig. 9.

thumbs are placed and kept steady on the abdominal wall, on places corresponding to the situations of the kidneys, just below the ribs; and the patient is told to breathe very deeply.

As he now makes strong expirations, we come further and further down, until we can at least easily feel the kidneys. Then the patient has to make thoracic respiration, so that the manipulation may not be hindered by the movement of the abdominal muscles. The kneading is made from without inward, and slightly from above downward, in order that the pressure may be applied in the direction of the venous circulation and the larger number of the renal canals. One kidney may be treated at a time. We then use the palmar surface of the fingers, and, while giving the treatment, stand or sit on the opposite side to the kidney subjected to manipulation.

Above the Pubic Arch.

In pétrissage above the pubic arch, the hand is placed just above it, and is spread out in a manner similar to that in general pétrissage of the abdomen. The movement here goes from side to side, and the kneading is made with the fingers and the root of the hand.

CHAPTER IV

TAPOTEMENT.

TAPOTEMENT means hacking or beating. The muscles principally in action are sometimes the flexors and extensors of the hand (palmar and dorsal); sometimes the radial and ulnar flexors. There is movement at the elbow. The joints of the wrist and hands are to be kept loose, no matter what kind of tapotement is given. This renders the manipulation

FIG. 10.

less hard and more elastic; the hand is heavier, and thus the effect of the stroke goes deeper.

The position of the hand, and the part of it which comes in contact with the body, must vary with the regions operated on.

The positions in which the patients are placed for the more advantageous application of this manipulation are generally:

For the Back.—The patient may lie face downward (as in Fig. 10), when frictions over the sensory nerves precede the manipulation, or he stands up slightly bending forward, with

his hands steadied, say against a wall. In both positions it is necessary to see that the chest is not compressed by a too near approximation of the arms to each other. They are never to be nearer than the transverse diameter of the thorax.

For the Liver.—The patient either has the hands folded behind his neck, as in Fig. 11, or with the right arm stretched up, as in Fig. 28.

For the Lumbar Region.—The positions are the same as for the back. We may also give the tapotement while the

FIG. 11.

FIG. 12.

patient, with extended arms (upward), bends forward or sideways.

For the Sacral, Gluteal, and Perineal Regions.—The patient takes up the position shown in Fig. 12; or the beating is given in connection with the active movement shown in Fig. 56.

At the different parts of the body the tapotement is given as follows:

On the Head.—Tapotement is made with the ulnar side of the fingers, or with their tips; but this procedure is entirely

unnecessary, and nerve vibrations and frictions should be used instead.

On the Chest.—The palm of the hand is used (Fig. 13).

We see that the right hand, which is about to make the stroke, is not kept straight. It is only straightened out at the last moment, partly by a slight action of the extensor muscles, partly by the swing of the stroke. The difference between the stroke of a hand with fingers straight and the wrist stiff, and one held as I have just described, is indeed great. In the

FIG. 13.

former case, the weight of the hand falling on the chest is lessened, and the effect is more external than internal, where it is expected to set the air into vibration, and stimulate the lungs.

The operator stands in front of the patient, and passes the arms round his chest until the hands have come well up between the shoulder-blades of the patient. He now begins the beating, passing up and down between the shoulder-blades, then over the sides of thorax, and lastly the front of the chest is treated. The patient makes deep and slow inspirations all the time.

It is given in chronic affections of the lungs, and is accompanied by movements which produce deep respiration.

On the Back.—The hands are kept midway between supination and pronation, with the fingers slightly bent (Fig. 14).

FIG. 14.

Just before the hand strikes the back it is more supined, in order that the ulnar edge itself may not strike, but that part

FIG. 15.

of the dorsal surface of the hand which is just outside it. The advantages of this are a softer blow, the fingers are spread out more, and deeper and superficial tissues are thus stimulated at the same time.

The movement should be carried three or four times up and down the back, parallel to and a little to the side of the vertebral column.

On the Lumbar Region.—We pass transversely over it, in order to be able to apply the treatment more powerfully, as the muscular mass is greater.

For the Liver.—The hacking is made over the lower part of the right side of the thorax, with the hand held in the same manner as for the back.

For the Sacral, Gluteal, and Perineal Regions, we keep the hands closed, but not firmly so. The stroke in the first

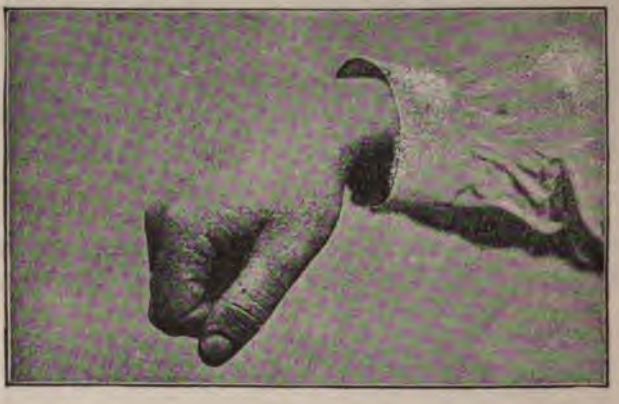

Fig. 16.

two cases is applied with the anterior part of the closed hand (Fig. 15); in the last, with the radial side (Fig. 16), because otherwise it cannot well enter the perineal space.

Tapotement in these places is made in connection with the treatment of constipation, disorders of the bladder, male and female generative organs.

For the Limbs.—The hands are either held in the same way as for the back, or the radial sides of the two hands are worked with simultaneously. The fingers are not to be kept extended, but loosely flexed, as in Fig. 17.

Whenever tapotement is given, stroke must follow upon stroke in quick succession, in order to increase the intensity of the manipulation.

The tapotement sets the muscular fibres into vibration, and

stimulates them to contract, the activity in superficial vessels and nerves is increased, and, as said before, when applied to

Fig. 17.

the back and thorax, the vibration is propagated on to internal parts. The duration of the manipulation is of necessity everywhere very short.

CHAPTER V.

MASSAGE À FRICTION.

FOR my own part, I cannot see the use of this expression, as the movement is certainly a kneading one, and thus only a modification of pétrissage.

The movement is the same as pétrissage, with the thumb alone, or with one or more of the fingers, but they are put at a greater—generally right—angle toward the part worked

FIG. 18.

upon (Fig. 18); the circular or elliptical movement is smaller, and the pressure more equal throughout, as we wish simply by mechanical force to reduce thickenings and depositions. Effleurage follows on it, or is given alternately with the friction.

Massage à friction is chiefly had recourse to for organized exudations or hardened depositions, which we find round joints, such as the ankle, wrist, knee, etc., and for thickening of tendons.

CHAPTER VI.

GENERAL ROLLING AND SHAKING OF THE MUSCLES OF THE EXTREMITIES.

THE rolling and the shaking can easily be made at the same time on the limbs. The muscles must be completely relaxed. Take, for instance, the arm. The patient holds it in a horizontal position by steadying the hand on a table or the back of a chair. Both hands of the operator are placed lightly

FIG. 19.

on the arm, and are moved quickly round it as they pass up and down two or three times (Fig. 19).

The effect is very stimulating and agreeable to the patient.

This manipulation should be used after pétrissage, but may also be given alone in cases where there is no cause for a more special treatment of any particular muscle.

CHAPTER VII.

SHAKING.

THE part of the hand which, during the manipulation of shaking, comes in contact with the patient's body, is the distal phalanx of one or more fingers, and it or they should be applied softly and not pointedly.

The movement starts from the elbow-joint of the manipulator, where there is slight flexion and extension. Between it and the ultimate phalanges of the fingers, the bones of the forearm, wrist, and hands, with their intermediate joints, act, so to speak, as links in a chain, through which a wavelike motion is sent and propagated to the part worked upon.

The movement of the hand is very quick. The joints must not be kept stiff, but just so far extended that elasticity is permitted and not hindered. If this is not attended to, the manipulation becomes hard and pushing. The patient strains his muscles because of the pain and discomfort caused him, and the movement is either productive of bad consequences or has no effect at all.

This manipulation promotes and quickens resorption; it stimulates and strengthens; it diminishes pain by its power to reduce congestion and inflammation; and it increases the secretion of the glands.

It is given for a period varying in length from a few to several minutes, depending upon the disorder and the effect produced.

The illustrations which are appended to the various movements will make it easier to understand how the fingers are applied, and how they work at different portions of the body.

SHAKING OF THE PHARYNX.

There are three different manipulations for the pharynx, and these have already been described by me ("Medical Press and Circular," July 25th, 1888).

1st. The fingers of one hand are placed, with the palmar surface upward, as far back as possible, two on each side of

FIG. 20.

the root of the tongue. Then a quick, shaking movement is made in an upward and slightly forward direction (Fig. 20).

FIG. 21.

If, while giving this shaking, we move our fingers forward, it is evident that the tongue, submaxillary and sublingual glands, will be more especially affected.

2d. The root of the tongue is grasped between the thumb and the fingers, and shaken in a lateral direction (Fig. 21).

FIG. 22.

3d. The tips of the fingers are placed behind the ascending ramus of the lower jaw (Figs. 22 and 23).

FIG. 23.

Here the movement has the direction inward, forward, and downward. One side may be treated after the other, or both

simultaneously, and the operator may either stand in front of or behind the patient. The fingers must be pushed deeply in before the manipulation begins. The greater the distance the motion set up has to pass before it comes to the actual seat of the complaint, the smaller its effect will be.

The head ought to be bent a little forward, in order to relax the cervical fascia and the muscles, which would otherwise prove a considerable hindrance. As a security for this position, the free hand is placed either just above the forehead, or, better still, below the occiput.

The first two movements have in themselves a tendency to bring the head back, and this action is heightened by the patient himself, who instinctively draws away from the working hand, the more so if the complaint from which he is suffering be acute or painful.

When the third manipulation is given with one hand, the head is first turned a little to the opposite side, and then bent toward the one to be treated. This gives a much larger and freer space to work on.

The whole of the pharynx is more or less acted upon by these manipulations, and their effect, if correctly executed, is very rapidly beneficial in nearly all affections of the throat.

Shaking of the Larynx and Upper Part of the Trachea.

The tips of the fingers are placed on one side of the thyroid cartilage, and the thumb on the other (Fig. 24).

The shaking is made sideways. This movement has little effect on the larynx itself, which moves as a whole, but acts more particularly on the part of the trachea below it, as the wave motion passes downward. It is therefore of use in croup and affections of the upper part of the trachea.

If, retaining the same position of the hand, and passing it downward, we make a similar side movement, we act more directly on the trachea itself; and the nearer we approach the sternum the more deeply into the chest is this movement propagated.

Instead of grasping the trachea, we may place two or more fingers on it, in the hollow of the sternum, in the manner

shown in Fig. 25. In this manipulation it is of the highest importance that the hand lies close to the throat, in order that the angle formed between the fingers and the trachea may be as small as possible. When the angle is increased, the movement loses its softness; it becomes disagreeable to the patient; the motion produced is, of course, less in the direction of the

FIG. 24.

FIG. 25.

trachea, and thus its range of effect becomes more and more limited, until, when the angle is large, the benefit is practically nil.

The patient must sit perfectly upright. The shoulders are to be well thrown back, in order that the respiration may go freely and well.

These shakings, accompanied by tapotement on the chest and between the shoulder-blades, are of very great service in bronchitis and chronic disorders of the lungs.

Shakings of Lower Part of the Thorax.

The patient stands with the hands folded behind his neck, as in Fig. 26.

The operator places one hand on each side of the lower part of the thorax. With the palms he makes soft and quick

Fig. 26.

compressions, alternating with relaxation. During the latter the hands are not to be lifted from the thorax, but should remain in close contact with it. The patient must breathe deeply. The ribs, being elastic, rebound when the pressure is left off, and the respiration becomes freer and deeper. Besides this, the movement has the influence on pleuritic adhesions at the lower part of the thorax of breaking them down, and the organs in the upper part of the abdominal cavity, below the vault of the diaphragm, are also affected.

This movement is usually given after tapotement of the chest.

Shaking at the Pit of the Stomach.

The patient either stands (Fig. 27), or lies in the recumbent position, as in Fig. 6, in both cases with the hands folded behind his neck. The fingers are placed midway between the ensiform cartilage of the sternum and the navel. We see from the position of the fingers, that they have above them the pyloric part of the stomach and the left lobe of the liver, while

Fig. 27.

just beneath them lies the solar plexus. The movement is made in a backward and slightly upward direction. As the stomach and its continuation, the duodenum, have involuntary muscles in their walls, which are more sensitive to stimulation by reason of their tendency to automatic contraction, and as the solar plexus commands the circulation in the abdomen, we may readily understand that this manipulation must indeed have a great effect. It is therefore used in chronic affections of the stomach and the liver.

Shakings at this spot, when made gently, will relieve

spasms in the diaphragm. For this I have used it with success, both when the cause was reflex, as in hiccough, and in chloroform narcosis.

The stomach and the liver may separately come in for treatment, as we, continuing our shaking, follow the lower border of the thorax to the left or to the right. On our way toward the right there is one place which needs special attention, viz., just under the ninth rib cartilage and the outer

Fig. 28.

border of the rectus abdominalis muscle, where the gall-bladder lies. In patients suffering from impaction of a biliary calculus in the duct, shaking here is sure to be attended with success.

In the recumbent position it is usually given with general pétrissage of the abdomen. When the shaking is administered separately for the liver, the standing side position, as in Fig. 28, is mostly preferred; and in the same attitude, with the left arm raised, the stomach can also be treated.

In derangements of the liver we can in this position work with the left hand between the lower part of the shoulder-

blade of the right side and the spine, where we are certain to find tender places.

It is always usual to accompany shaking of the liver by tapotement over the right side of the thorax.

It is evident that when we follow the lower border of the thorax toward the left, and give the shaking, that the spleen must also be acted upon. I have seen this mode of treatment produce marked change for the better in patients suffering from enlarged spleen, resulting from malaria.

If the hand is spread out over the surface of the abdomen, and strong shakings made, the whole of the intestine is stimulated to greater activity, the peristaltic movement is increased, and the secretion from the glands is brisker; and thus they are indicated in sluggish action of the bowels.

Shaking of the Bladder.

For the shaking of the bladder we have three positions. In two—the recumbent and the standing—the manipulation is

Fig. 29.

given above the pubic arch (Figs. 29 and 30); and in the latter the patient bends slightly forward, in order to relax the abdominal muscles. In the third he lies in the prone position, with the legs a little apart, and the toes turned inward in order to give more room.

When the bladder is acted upon from above, the fingers are placed about one inch superior to the pubic arch, and the di-

rection of the shaking is from above, downward and backward. In the perineum the fingers are placed just in front of the anal aperture, and the movement passes downward and forward.

By this manipulation we act on the bladder and the prostate, and if we change the direction from below upward in

FIG. 30.

the prone position, the lower part of the rectum comes in for treatment.

In the same position, and for females, backward displacements of the uterus are relieved.

This manipulation ought in every case to be followed by the lighter vibration described further on, and by nerve frictions over the sacral, gluteal, and lumbar regions; and should be preceded by tapotement over the same parts.

CHAPTER VIII.

VIBRATIONS.

THE vibrations are, one might say, only fine shaking movements.

The whole or part of the palmar surface of the hand or fingers is used in this kind of manipulation. If we look at the illustration representing vibration of the thorax (Fig. 33), it will be easier to understand its mechanism. Here, as in the shaking, there is flexion and extension at the elbow, but they are much smaller. The movements in the loose wrist-joint are abduction and adduction (*i.e.*, radial and ulnar flexion) of the hand, which lies immovable, so far as the part of the surface of the body on which it rests is concerned. Through the quick succession of the individual movements the vibrations are produced. If flexion and extension are allowed at the wrist, pressure is caused. The injurious influence of this in different localities, say over a weak heart, certainly needs no explanation.

As the vibrations are so often used in order to relieve pain, it is evident how important it is not to work with a stiff hand and wrist. Indeed, the entire advantage of the movement is lost if this be not attended to. On the other hand, when given correctly the vibrations are bound to relieve pain, no matter what the cause of the pain may be.

The straining of the muscles in the operator's arm ought to be so slight as to be scarcely perceptible to any one who has his hand over them.

On no account are the vibrations to be produced by the continued strong contraction of the muscles of the shoulder, arm, and hand. When given thus, the manipulation becomes hard, and the intensity, the acute sensibility that the operator should have of the pressure he is applying, gets lost, while it is impossible to continue the treatment for any length of time, even for a few minutes. The effect over a weak heart is as

bad as flexion and extension at the wrist-joint, if not worse. The patient will constantly feel pain, because pressure cannot be avoided, and maybe he will faint.

I will give a few instances in which one can perceive the difference between a movement produced by strong contraction of the muscles of the arm—which of course carries with it an immovable wrist and hand—and the way in which I have described it:

1. Place the hand on the thigh. In the first kind of manipulation a harder grip of the muscles is necessary, the muscular mass moves as a whole, there are no vibrations just under the place of application of the hand, the range of the movement produced is much smaller; while in the second, the hand lies loosely on the surface, the vibrations pass into and are felt in the underlying muscles, and are widely propagated.

2. You may give vibrations to the anterior surface of the thorax, and feel them in the other hand placed on the back of the patient, while with the stiff arm and hand you feel nothing at all.

3. Place a glass of water in the middle of a fairly large table. Make the vibrations, and if the water moves as a whole from side to side they are made wrongly, but if the surface of the water quickens in the centre only they are made correctly.

This may give an idea of how delicate the movements really are, and how it is possible to use them in disorders where shakings and the ordinary massage manipulations are entirely out of question.

The vibrations have a much greater effect than the shakings in the production of resorption, and especially in diminishing pain, both of which can be seen in congestions and acute and chronic inflammatory conditions.

Vibrations of the Eyes.

There are two kinds:

1. The patient closes the eyes, and the operator, standing behind him, lays two of the fingers on each eye, and commences the vibrations (Fig. 31). He has to take care that the eyelids do not move up and down, but are kept steady on the eyeball, so that the vibrations pass through them.

2. We may place the distal phalanx of the thumb on the

outer side of one eye, and the same phalanx of the fore and long fingers on the outer side of the other eye (as seen in Fig.

Fig. 31.

32), and make the vibrations. They ought to be felt deeply through the eyeballs.

Fig. 32.

The first movement, which does not penetrate so deep, affects the superficial parts, while by the latter the deeper

parts are more acted upon. They should always be accompanied by frictions and vibrations over all the sensory nerves round the eye, and also by frictions on the eyeball itself, as will be described later on.

I have found these movements to be of great benefit in affections of the cornea and conjunctiva, not only in relieving the inflammation, pain, and photophobia, but also in accelerating the healing process.

Vibrations of the Throat.

When vibrations are given for ailments of the throat, the fingers are placed in the same position as for shakings; and the former are here always substituted for the latter at the beginning of acute inflammation.

As there are many glands in this region, I may at this point state that whenever enlarged glands are treated by the manual method, these vibrations should be used, and they will not be had recourse to in vain.

Vibrations of the Larynx.

For the larynx the application of the fingers is the same as shown in Fig. 24, and it is evident that the vibrations have a direct effect on the larynx itself, while the shakings tend to pass over it.

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The position of the patient should be either lying down straight on his back, with the hands clasped behind the neck, or standing up, as in Fig. 33.

The place of application of the hand in giving vibrations for the thorax, varies with the nature of the disorder we are treating. The whole hand is here used. It lies loose and free, without pressure, on the thoracic wall. The vibrations pass through the thoracic wall to the lungs, which they stimulate and strengthen. They produce free expectoration, followed by less irritation, promote rest and a feeling of ease, and, when administered in conjunction with nerve frictions between the shoulder-blades, etc., also reduce congestive and

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ness on walking quickly or going up-stairs, a feeling of lassitude, and profuse sweating—the patient, to use his own expression, being bathed in perspiration. Deep inspiration gave pain at the tip of both the lungs, more so on the right side; same on coughing. Respiration was short and quick—even up to thirty-eight in the minute. Slight dulness at both the apices — more marked on the right side. Appetite not good.

The lung symptoms were treated with vibrations and tapotement of the thorax, movements causing deep respiration, nerve frictions, and tapotement between the shoulder-blades, especially at the upper part, where the patient was very sensitive; the dysentery with vibrations and general pétrissage of the abdomen. In addition, the patient received some general treatment including nerve frictions.

The cough gradually passed away; the sweating during the night ceased; the respiration grew deep and free—sixteen to eighteen a minute; no breathlessness; the appetite was good. During the time he was under treatment the patient had no attack of dysentery. He has enjoyed excellent health ever since.

The treatment lasted a fortnight.

Vibrations over the Heart.

If we are to give vibrations over the heart, they must be given very carefully, the hand being placed lightly over the apex. Just as their effect is good when properly executed, so the result is mischievous when they are unskilfully performed. A weak heart has already more than enough work to do, and if a heavy hand is added, rendered still heavier by a stiff wrist, together with flexion and extension at the same place, it is no wonder the patient feels anything but ease, and frequently pain, and sometimes even faints.

According to the condition of the patient, he may lie or stand—the arms may be up or down, and the hands fixed behind the neck (Fig. 33)—but the chest must always be well thrown out.

The effect of the vibrations is a stronger, quieter, and better beat. This is well seen in a fainting fit when the heart stops or begins to flag, and also in the opposite condition, viz.,

...palpitation. During the former, the beat soon comes back or grows stronger; while in the latter steadiness in its action returns.

In recovering from shock, the simplest method of reviving the patient is to compress the internal jugular veins.

Vibrations of the Abdomen, or Part of it.

For vibrations of the abdomen in general, the position of the patient and the position of the hand are precisely the same as in petrissage. For special situations, part of the palm and fingers, or the back of the fingers of the lightly-closed hand, are used.

These vibrations are valuable in relieving pain and stopping diarrhœa, whatever the cause of these may be; but they should never be given in cases of constipation, for they tend to produce this condition.

In connection with the action of vibrations of the abdomen on diarrhœa, I may mention the case of a gentleman, about fifty-seven years old, who suffered from this complaint. For five or six weeks he had felt pain and discomfort in the abdomen generally. During day and night he had frequent calls to stool, and the motions were constantly mingled with blood. After two treatments his bowels acted perfectly normal, and the pains had of course disappeared.

A friend of mine, a young Swedish officer, whom I met while at Stockholm last autumn, had suffered intensely from diarrhœa for some weeks before he mentioned the fact to me. He was growing seriously pale and thin. I treated him for the first time one evening before he went to bed. The night that followed that treatment was the first during which he had complete rest for over a fortnight; while previously he had been obliged to rise several times every night. I continued the treatment for a few days: and during the four or five weeks I afterward stayed in Stockholm he had no relapse.

As regards pain, I have relieved it both in colic, in acute general peritonitis, and perityphlitis. The effect of vibrations in causing constipation is of marked advantage in cases of this kind, where action of the bowels is contra-indicated.

For the bladder, it is better to use the back of the flexed fingers, and the hand should be well down in the pelvis.

At the pit of the stomach we have recourse to vibrations in painful gastric conditions, such as ulcer, acute catarrh, and nervous dyspepsia. They probably produce their effect through the solar plexus of the sympathetic.

When we use them for pain at the menstrual period, p.-p. hemorrhage, metritis, endometritis, etc., the uterus must be grasped between the fingers and the thumb, and quick and light frictions made at the same time as the vibrations. This mode of treatment dispenses with the internal manipulation in the above-named disorders.

In vibrations for affections of the anus, such as hemorrhoids and prolapsus, the last phalanx of one or more fingers is used. In prolapsus ani, the tips of the fingers are placed round the protruding mass before the vibrations begin.

In treatment of piles it is not sufficient to apply local treatment; but shaking of the liver, pétrissage of the abdomen, etc., must also be resorted to.

Vibrations over Ulcers.

It is necessary to cover the ulcer with a piece of linen or lint moistened with some antiseptic solution, and over this again some gutta-percha, in order to prevent the heat of the hand from passing to the ulcer. The palm of the hand is afterward applied, and the vibrations made. These have to be combined with pétrissage round the ulcer, in order that the parts surrounding it may be kept healthy, and stimulated to greater activity.

Vibrations for Furencles and Abscesses.

The tips of the fingers and thumb are placed at the periphery of the affected tissues, and during vibrations are approximated to each other, passing gradually toward the middle. The effect of this is to drive the degenerated blood serum to the centre, and pointing takes place quicker. When the abscess has been opened, this manipulation removes the pus from the abscess cavity more completely and painlessly than by the ordinary method of pressure.

CHAPTER IX.

NERVE VIBRATIONS.

In the "Medical Press and Circular" of July 25th, 1888, I have already spoken about the different ways of causing nerve vibrations, and perhaps I may be allowed to quote what I then said: "The manipulator causes the nerve to vibrate either by frictions made transversely over it, in a manner similar to that in which a harp-player passes his fingers over the strings of his harp; or he makes vibrations over the nerve. When the latter method is adopted, he either follows its course with the tips of his fingers in a centripetal direction, or he keeps them fixed, and vibrates upon such parts of it as are more painful.

"The different methods of procedure (frictions or vibrations) depend upon the position and surroundings of the nerve. Nervus medianus is very suitable for demonstration of the first. The arm is abducted until it reaches the horizontal position. The nerve coming out of the axilla can be easily felt as a thick cord lying to the outside of the bronchial artery. When the tips of the fingers are quickly drawn over it transversely in the manner indicated above, a feeling is produced similar to that felt on electric stimulation. Nervus supra-orbitalis, which lies on the bone, is a good instance where the second kind of procedure may be employed.

"It is essential that the tissues which lie between the fingers and the nerve should move with the former as one; otherwise the friction does not reach its destination, and the manipulation becomes useless.

"According to my own experience, the effects of this mechanical method are, so far as I can judge—

"1. *Raising of the nervous energy.*

"2. *Diminution of pain* (as seen in facial neuralgia, sciatica, migraine, and similar disorders).

"3. *Contraction of the smaller blood-vessels.* (Heaviness

of the head is quickly relieved by stimulation of the sensory nerves of the scalp. Frictions over the sensory branches of the cervical and brachial plexuses in the neck produce in nearly every person a chilly feeling passing down over the body, often accompanied by cutis anserina.)

"4. *Stimulation of the muscles to contraction.* (In several persons in a weak condition, and some whose nervous system was highly irritable, I have seen this well marked; frictions over the N. musculo-spiralis being followed by corresponding flexion and extension of the wrist, and also of the fingers.)"

I may mention that in a lady patient, whom I have seen during the last weeks of my stay at Pola, and who suffered from spastic (reflex) paraplegia, whose inferior extremities had remained stiffly extended for nearly five years, after a difficult child-bed, contraction of the muscles and flexion of the legs instantly followed stimulation of the nerves of the leg and those under the foot. They returned to their extended position when the stimulation ceased; but, after treatment for a few times, the feet could be separated for a distance of about 20 cm., and the stiffness of the knee and ankle was not so absolute as before. I can add—

"5. *Increased secretion of the glands.* (Frictions over the facial nerve, or in the situation where the submaxillary ganglion lies, are instantly followed by increase of the secretion of saliva.)

"6. *Diminished excretion from the skin.* I have often noticed while treating patients with frictions over the cervical nerves that the perspiration which at first has been perceptible all over the body has quickly disappeared under the influence of these movements, and that free perspiration in the palms of the hands has passed away on frictions being applied to the median nerve.

"7. *Decrease of temperature.* This is well marked in fevers and feverish conditions.

"As regards pressure on the nerves, I have found it very useful in many cases of migraine and neuralgia. The pressure was kept up for a period varying from a few to several minutes at the time, and after a slight interval renewed, the whole lasting from five to twenty minutes."

My brother, Mr. Henrik Kellgren, has, during the last twenty years, worked out and greatly developed this system

of direct mechanical stimulation of the nerves. Ling and his pupils had already an idea of this method, as is shown by the writings of Georgii ("Traitement des maladies par le mouvement," Paris, 1847).

They had noticed the effect of frictions applied from the front backward in the line of the longitudinal sinus, and also of the lateral one. They found that these frictions produced not only a contraction of the skin on the cranium, but also a

FIG. 34.

shivering feeling down the back, and they used them with success in several cases of fulness of blood in the head and congestion of the brain.

The fingers and the thumb are kept slightly bent, so that the back of the nails come in contact with the scalp, and with light vibrations they are passed backward (Fig. 34). When they arrive at the occipital protuberance, the fingers follow the direction of one of the lateral sinuses, the thumb that of the other.

That the effect of these vibrations should be considerable, we can deduce from the feeling they produce; as also from

the fact that all the sensory nerves of the scalp pass up to the vertex, and are thus acted upon.

These frictions ought never to be omitted in a general treatment of the head. With them we must give movements which draw the blood away from the head or toward it, according to the requirements of the case.

Ling and his pupils also tried frictions over the phrenic and great sciatic nerves. The former they manipulated, in order to relieve spasm of the diaphragm. This is easier, and with greater certainty allayed by light shakings in the pit of the stomach, as was well seen in a patient at the Marine Hospital at Pola, who during chloroform narcosis was seized with this spasm. The shakings had the direction from below upward and backward.

Whenever a sensory nerve is stimulated by electricity, it causes contraction of the blood-vessels. Since these frictions over the median and several other nerves give exactly the same feeling as that from an electrical shock, and as the chilly sensation passing over the body, accompanied with cutis anserina, must be caused by contraction of the smaller blood-vessels of the skin, these frictions, with their consequent vibrations, must produce the same effect as the electrical stimulation does. I have taken this as the guiding idea for the use of this form of nerve stimulation, and the results certainly seem to justify the belief.

We must take care, however, before this mechanical stimulation is applied, either to feel the nerve or be perfectly certain as to its topographical situation, and to be well down on it when it lies deeply, as, for instance, in the case of the great sciatic in the gluteal region.

When we have to do with a muscular or mixed nerve, and our intention is merely to stimulate it in an ordinary way, we give frictions, and may pass up and down its course; but when pain is present, or the nerve purely sensory, vibrations alone, or followed by constant pressure, are to be preferred. The vibrations are then administered as previously described. We ought also to remember, that we have often several nerves coming from the same plexus, and that although only one branch of a nerve may seem to give pain, the other nerves or branches send their stimulation to the same centre, and thus act reflexly on the affected nerve or branch.

There is no doubt but that in these nerve vibrations, combined with other passive and active movements, a powerful weapon has been given us against the progress of most of the nervous diseases. I have seen several cases of paralysis, locomotor ataxia, spastic paralysis, infantine paralysis, etc., which have been greatly relieved. The result of the manual method in these and other nervous diseases would be still more successful if the patients had recourse to the treatment sooner. At present it is used as the last plank after everything else has failed. Not only have we then to contend with the diseases in their very advanced stages, but also with the sunken courage and lost energy of the patient, which react so unfavorably on his general health.

I may now proceed to give some directions as to the best and easiest places to find the different nerves.

NERVES OF THE HEAD AND NECK.

Nervus Occipitalis Major, Nervus Occipitalis Minor, and Nervus Auricularis Major.

These are all branches of the second pair of cervical nerves, the latter also having a root from the third pair. We find them best a little below the lower half of the mastoid process (Fig. 35). Frictions there cause a feeling of coldness to run down over the body; and if they are made strongly, pain is felt, not only at the points of application of the fingers, but also inside the head, as far forward as the frontal region, and up on the vertex.

Treatment of these nerves relieves headache and congestion of the brain, and its effect is extremely good in hemicrania, sleeplessness, etc. In migraine, the above-mentioned feeling of pain is most beautifully demonstrated. I have, with treatment of these nerves, also cured severe headaches in fevers. During my stay at Pola there was a slight epidemic of cerebrospinal meningitis. A naval officer was brought to the hospital, suffering from this disease. He had had for four days and nights most severe headache and fever. Antipyrine, subcutaneous injections of morphia, and other remedies, had been tried, but the headache did not diminish, nor did he obtain sleep. I was asked to try to relieve him. I gave him fric-

tions over these nerves, alternating with constant pressure, vibrations on the vertex in the line of the longitudinal sinus, as described before, together with some other passive movements which lead the blood from the head, and finished up with general pétrissage of the abdomen. After the first treatment in the morning, the headache disappeared, and the patient slept for some hours. I treated him again in the afternoon and evening. As the latter approached, he had oc-

Fig. 35.

casionally slight headache, but it soon passed away. After the last treatment he felt free in his head. During the night he slept well, and the following morning had no headache. The headache did not reappear.

At first, vibrations should be made for several minutes, and then an immovable constant pressure kept up with the fingers. The patient feels at first severe pain in the head, but this either passes entirely away during the manipulation, or disappears very shortly after the cessation of treatment. When there is congestion of the brain and fulness of blood, all the nerves of the scalp should be treated.

Nervus Supraorbitalis.

This nerve is best found at the supraorbital notch or foramen. If there is a notch, the nerve is easy to find; but when it passes through a foramen it is best reached by placing the tip of the fore or long finger in the orbit, and feeling it as it lies against the roof just before it goes into the foramen. In these two situations, it is better to make frictions over it with

Fig. 36.

Fig. 37.

the back part of the nail, taking care not to apply the edge. (Note the strong bending of the last phalanx in Fig. 36.)

On the forehead we first trace the nerve from the notch upward under light frictions, and we find it lying like a thin cord, curving somewhat outward toward the temples. Having delineated its course, the vibrations are begun, and made time after time in the centripetal direction (Fig. 37).

Fig. 38 shows how the thumb is applied to the forefinger when we work with the back of its nail, viz., not at the very tip, but nearer the last phalangeal joint. This imparts greater softness to the manipulation.

For neuralgia in this nerve, it is often enough to treat it alone; but if this is not successful, I give vibrations over the other branches from the same nerve stem.

Nervus Supratrochlearis and Nervus Nasalis.

The supratrochlear nerve comes out at the inner part of the orbit, and it runs nearly vertically upward.

The nasal nerve is found to emerge on the side of the nose at the nasal bone with the cartilage.

Fig. 38.

Vibrations over these two nerves are very beneficial in catarrh of the nose, cold in the head, and its accompaniment, frontal headache.

A sensory twig, probably from the lachrymal nerve, turns round the edge of the orbit at its outer side, just opposite the outer canthus. Light frictions or vibrations there cause, even in sound persons, considerable irritation, while on those who have any affection of the eye the pain is very pronounced.

Nervus Maxillaris Superior and Nervus Mentalis.

If we pass down in a straight line from the supraorbital notch, we have no difficulty in finding these nerves, where they come out of their respective foramina. I have cured neuralgic toothache at once; and even in cases where the tooth has been

diseased, the pain often subsided when vibrations were applied over the nerves for a few minutes. I have also by the same treatment stopped the aching in the teeth and jaws following on strong mercurial inunction.

Nervus Facialis.

Frictions can most easily be applied to the facial nerve where it comes forward over the ascending ramus of the in-

Fig. 39.

ferior maxillary bone. They are made from above downward (Fig. 39).

The first effect, on friction being applied, is a peculiar sparkling sensation, not only over the side of the face, but also in the pharynx, and very frequently, too, in the ear.

This nerve, of course, should be stimulated in cases of facial paralysis.

While working under my brother, I had occasion to see two cases of complete recovery. One of the patients was a little boy, five years old, the other a girl of fourteen.

In all disorders of the throat, this nerve comes in for treatment, not only because of its connection with the pharynx, but also in order to produce increased flow of saliva from the parotid gland.

Nervus Lingualis.

In order to find the lingual nerve, we must bend the head a little to that side on which the nerve which is to be subjected to treatment is situated, and the friction is made from within outward. This also increases the secretion of saliva from the submaxillary glands.

If the patient sits with his head erect, and if we make a friction from behind forward between the submaxillary gland and the bone, a sparkling sensation indicates that the submaxillary ganglion has been touched.

Nerve Frictions and Vibrations on the Eyeball itself.

The patient is told to look downward, and then to close the eyes. The tip of the forefinger is placed on the upper part of

Fig. 40.

the eye, just to the inner side of the vertical diameter of the eyeball (Fig. 40).

Light frictions here cause a strong sensation, which is felt not only in the eye itself, but may even be experienced inside the skull at its anterior part.

At other places on the eye, the feeling is not so well marked. The patient has more the sensation of having sand in the eye.

These nerves are to be stimulated in affections of the eye, and also in migraine and ordinary headache. In a patient

who had lost a great deal of blood, and, following on this, suffered from a very severe headache, I had recourse to these vibrations on both eyes simultaneously, since all other treatment seemed of no avail. I was obliged to give the frictions for about fifteen minutes before the headache ceased entirely.

Nervus Laryngeus Superior.

This nerve is easily reached where it lies below the great cornua of the hyoid bone, and before it pierces the thyro-hyoid

Fig. 41.

membrane. The finger tip is placed at the posterior end of the upper border of the thyroid cartilage, and quickly drawn forward (Fig. 41).

Pain is felt at the place of application, in the larynx, often in the ear and pharynx, and up in the head. Indeed, when I practise this treatment on myself, and continue it for a few seconds, I feel either pain or prickling in these places; and in the brain I have a sensation as if a strong band were bound round it.

These nerves must be stimulated in affections of the larynx.

Nervus Laryngeus Inferior.

The head should be bent toward the side on which lies the nerve to be stimulated, and slightly forward. The finger is passed down beside the trachea to the inner side of the lower part of the sterno-mastoid muscle, and the friction is made toward the windpipe. Administered to healthy persons, it generally causes cough.

Nervus Vagus.

The vagus nerve lies in the sheath between the carotid artery and the internal jugular vein. We must have the head flexed a little forward, and feel for the pulsating artery. The finger is placed just outside it, carefully pressed downward, and afterward quick and sharp frictions are made transversely. In a patient with bronchitis or allied affection, this nearly always produces cough, and it should be given in combination with shaking of the trachea. Its effect on the heart is utilized when the action of the latter is too strong; and this effect must be taken into consideration in treating patients with weak hearts, or fainting may ensue. In derangements of the stomach and liver, frictions over this nerve often produce vomiting.

First Cervical Sympathetic Ganglion.

We stand behind the patient, whose head is at first slightly bent backward. The finger is then passed high up inside the angle of the lower jaw. We next flex the head forward, and as the cervical fascia relaxes, we pass the finger upward and backward until we reach the front of the vertebral column. The finger is now passed quickly from side to side, when pain is produced, varying in sharpness and extent of distribution according to the force with which the friction is given. The pain may be felt on the whole side of the head and pharynx. I have several times had patients under my hands, who, from frictions not over strong, have had a feeling of fainting. If the wideness of the distributing and connecting branches of the nerve are taken into consideration, these results may to some extent be accounted for.

Cervical Nerves.

Here, also, just as is shown in the illustration of nerve frictions over the second cervical pair (Fig. 35), we use the tips of the fingers on one side, and the last phalanx of the thumb on the other. We place them on the edges of the trapezius muscle. A sharp and quick friction is made at the same time as the tips of the fingers are approximated to that of the thumb. I have often seen, or rather felt, that new beginners have the habit of using equal pressure, or they push the fingers into the neck. On no account should this be done. The primary cause of the error, as in so many other cases of faulty manipulation, lies in the stiffness in the fingers and hands. This only gives pain, which is very unnecessary, instead of producing the symptom of correct application—*i.e.*, a cold feeling running down over the body.

As we pass down the neck, the distance between the points of application of the tips of the fingers and the thumb is somewhat increased; otherwise the frictions fall inside the places where the sensory nerves lie freer, and no effect at all is produced.

We must take advantage of these nerve frictions in fevers. It is then necessary to continue them for several minutes, the duration, of course, being dependent on the severity of the case.

For my own part, I always direct my attention specially to the places where the second pair of cervical nerves emerge.

NERVES OF THE TRUNK.

Lateral and Anterior Cutaneous Branches of the Intercostal Nerves.

If we make frictions somewhat obliquely from above downward over each intercostal space, a little anterior to a longitudinal line drawn midway between the anterior and posterior folds of the axilla, we shall find the lateral cutaneous branches of the intercostal nerves.

The anterior cutaneous branches of the intercostal nerves, from the second, third, and fourth, are especially large, and supply many branches to the mammary gland.

These anterior intercostal cutaneous branches are at once found where they come out in the intercostal spaces near the sternum.

Stimulation of these nerves and of the descending cervicals, passing down over the clavicle, is of importance, because they not only supply the skin over the chest, but also the mammary gland; and hence there are often shooting pains toward the neck and arms in inflammatory and other diseased conditions of the gland.

For the summer, 1885, I had charge of my brother's institution in London. A lady, about forty years of age, residing at Kensington, came for the treatment, having a hard lump at the upper and outer part of the left mamma. The skin was somewhat retracted, and could not be separated from the tumor.

This had been forming for some months, and was now an inch and a half in diameter. The patient complained of severe pain, which, when at its height, also passed down the left arm, and prevented her from sleeping.

The movements I prescribed were: Vibrations over the above-named nerves to be continued for five minutes; vibrations on the tumor itself for twenty minutes or more, until the pain was relieved; and a general treatment of active movements.

The patient was treated twice a day, having the special movements only in the evening. At the end of nine months she very seldom felt any pain. The tumor had gone, and only some fibrous strings could be felt at the original site of the swelling.

Dorsal Sensory Nerves.

When we make frictions over the dorsal sensory nerves, the patient usually lies in the prone position, as for tapotement of the back; in fact, we seldom give the latter alone, but usually precede it with the former method of treatment. The hands of the operator are held somewhat differently, depending on the place where they are applied. Between the shoulders, the back of the forefinger nail, steadied by the thumb, as seen in Fig. 38, is used, because otherwise it is very difficult in this position to give a good friction.

Below and above this point, the palmar surface of the last

phalanx is worked with. The direction of the friction is obliquely from below, upward or outward, or the reverse—as, for instance, if the patient lies on his back, and has the frictions after general pétrissage of the abdomen. For the general treatment of these nerves both hands are used at the same time (one on each side), and we generally pass up and down the back three or four times, pausing here and there over places that may be painful, and consequently need more special manipulation.

One ought not to pass carelessly up and down the back, or discard frictions in this region without full trial. It must be remembered that every pair of sensory nerves, springing as they do from the posterior primary divisions of the spinal nerves, may be regarded as being each in connection with its own segment of the spinal cord, while we must also bear in mind the intimate relations between the spinal nerves and the sympathetic ganglia. Indeed, it is found that in patients with heart disease or acute affections of the lungs, the region between the shoulders is very sensitive, and the effect of continued frictions extremely beneficial. I do not wish to be considered as saying too much before others have had the same experience, but I have, and my brother before me, treated cases of pneumonia with nerve frictions between the shoulders and vibrations on the thorax for the lungs, nerve frictions in the neck and over the dorsal sensory nerves for the fever and headache, and pétrissage of the abdomen for the circulation generally, without help of medicine, and have always succeeded. Any one who has some little knowledge of the treatment, may easily obtain confirmation of the fact that the sensory nerves on the side corresponding to the diseased lung respond very painfully indeed, while on the other side frictions give very little pain.

In disorders of the liver, we find tender places corresponding to the lower angle of the scapula on the right side. I may give an instance of the effect of stimulation of the nerves in this situation. Doct. Med. Eugen. Gruber, surgeon in the Imperial Austrian Navy, had a patient who suffered from biliary calculus. The patient had had several attacks, during which the pain had been reduced by injections of morphia. Some little time ago these attacks returned; the patient was again obliged, as heretofore, to take to her bed, and suffered

very much. Dr. Gruber prescribed, as usual, subcutaneous injections. The pain was not relieved, although two injections were administered. Then he remembered what I had shown, and tried nerve frictions. In the back, as described, he easily found some very tender places. He made frictions over them. They at once produced a strong fit of vomiting, the pain was relieved, and the patient was better.

In diseases of the kidney we have to turn our attention to the lower dorsal nerves. When the generative organs, the bladder, and the rectum are affected, we also find tender places in the lumbar and sacral regions. There are two places in the lumbar region which respond very readily to frictions, viz., just below the twelfth rib, at the angle formed by it and the deeper muscles of the back, and at the base of the spine, where an angle is formed by the same muscles and the crest of the os ilium.

A lady, 27 years old, married, no children, had from the very first suffered agonizing pain at each menstrual period. The pain set in two or three days before the catamenial flow began, and continued throughout the whole period, leaving her completely exhausted for several days. During the attack she was confined to her bed, and could often not lie down, but was obliged to sit up, and she was able to obtain very little sleep. The abdomen—especially its lower part—was painful to the touch. The patient had become anæmic, weak, and nervous.

The special treatment applied was nerve frictions at the upper and lower parts of the lumbar regions and over the sacrum, and vibrations on the lower parts of the abdomen. In addition, some general movements were given.

The treatment extended over three menstrual periods, beginning shortly before one, and finishing a few days after the third.

Her condition had already during the first improved to such an extent that she could come to see me every day. During the second period she had only one attack of pain, and at the third she suffered no pain whatever. The general condition had greatly improved.

If we look at the anatomical arrangement of the nerves, it gives a possible reason for these conditions. The sympathetic ganglia in the neck have communicating branches

with all the cervical spinal nerves, and each ganglion gives a nerve to the cardiac plexus. In the dorsal region the sympathetic ganglia all communicate with the corresponding spinal nerves, and the upper five ganglia send branches to the pulmonic system, through the medium of the cardiac and pulmonary plexuses; while from the sixth to the tenth dorsal ganglia, branches unite to form the great splanchnic, which passes to the semilunar ganglia of the solar plexus. The eleventh and eleventh ganglia give origin to the small splanchnic, which joins the solar and renal plexuses; and from the twelfth ganglion arises the smallest splanchnic, which enters the renal plexus.

The same intimate connections also exist between the sympathetic and the lumbar and sacral spinal nerves.

Reflexly, we ought then to be able to react on the organs supplied from the different sympathetic plexuses, as well as to relieve pain in the corresponding sensory nerves.

Over the sacrum the same position of the hand is used as between the shoulders; or the hand is lightly closed, and we work with the knuckles. The nerves here should always be stimulated after the shaking and vibration movements in derangements of the pelvic organs.

We should not forget, in general nerve treatment of the back, to follow the crest of the os ilium, and to give frictions where the topographical anatomy teaches us that the sensory branches of the last dorsal nerve, ilio-hypogastric nerve, and upper lumbar nerves pass downward. When the frictions are correctly made, *i.e.*, a little obliquely, these nerves respond readily.

NERVES OF THE LOWER EXTREMITY.

Nervus Ischiadicus Major.

This is far the most important nerve in the lower extremity. It emerges, as we know, through the great sacro-sciatic foramen beneath the gluteus maximus, and lying nearly midway between the great trochanter of the femur and the tuberosity of the ischium, it passes straight down the back of the thigh to the popliteal space.

The patient is placed in the prone position, as shown in Fig. 5, and the foot of the leg to be treated is crossed over the

other. We have here a position in which we can manipulate all the nerves on the back of the limb most readily, because all the muscles from those of the gluteal region down to the calf are more or less relaxed.

If we wish only to stimulate the nerve in a general treatment, and when there is no particular pain, then a few quick frictions should be made over the nerve, while we follow its course upward and downward. I must repeat here, what I have said before, that care must be taken not to make the friction before one is well down upon the nerve, or feels it, as in the popliteal space. On the other hand, if we have to do with a patient who suffers from such a complaint as sciatica, it is better to put the last phalanx of the thumb over the nerve where it emerges from the pelvis, and to make vibrations there. In recent cases of sciatica I have treated, I proceeded in this way, and the consequences for the better were really remarkable. In order to take the vibrations on their own merit, I gave nothing else at the beginning. Not only did the pain diminish and nearly disappear after my first treatment, but the improvement was sustained; and where the patients had been racked with pain day and night, they obtained rest and could sleep.

In the popliteal space, at its upper part, the nerve divides into the internal and external popliteal nerves.

The internal, passing as it does right through the popliteal space, is easily felt, and there is little or no difficulty in applying frictions to it. When it passes down into the calf as posterior tibial, and is covered by the large muscles of that region, we must take care that these move with our fingers. Behind the internal malleolus, it lies with the artery quite superficially, between the tendons of the flexor longus digitorum and flexor longus hallucis. Frictions over the nerve in this position give the same tingling feeling as when the "funny bone" is struck. By slightly stretching and inverting the foot, we can follow the nerve to its division into internal and external plantar nerves, where strong frictions produce marked pain.

The external saphenous nerve lies superficially in the middle line of the calf. As it is a sensory nerve, we pass from below upward, while giving light vibrations.

The external popliteal is best found behind the head of the

fibrils and frictions at that spot often produce a sparkling feeling in the foot.

Nervus Femoralis Anterior.

We can easily find this nerve where it lies in Scarpa's triangle, and apply vibrations to it. Passing from it downward and forward on the inner side of the thigh and knee, is the internal saphenous, which is purely sensory, and is therefore more effectively acted upon by vibrations in the centripetal direction.

Nervus Cutaneus Externus.

Sometimes neuralgic pains are felt in this branch of the lumbar plexus. We find the nerve about an inch below the anterior superior spine of the ilium.

Nervus Obturatorius.

In order to affect this nerve, we must flex and somewhat adduct the thigh. It passes out of the thyroid foramen at its upper border, and we must try to find it there.

Sensory Nerves on the Foot.

Passing forward below the external malleolus, we can easily find the external saphenous, as it goes about half an inch above the outer edge of the foot.

The other sensory branches on the dorsum of the foot are derived from the external cutaneous and the terminal of the anterior tibial, the latter emerging between the first and second toes. We can stimulate these by simply passing quickly with the nail transversely over the surface.

Nerves of the Upper Extremity.

We can reach all the chords of the brachial plexus either above the clavicle at the base of the posterior triangle of the neck, with deep frictions from before backward, or we can depress the arm slightly, and pass our fingers high up in the axilla, and manipulate them there.

Nervus Circumflexus.

The nerve passes through the quadrilateral space formed by the two teres muscles with the humerus and the long head of the triceps muscle, and, diving below the deltoid, it comes round the neck of the humerus. The arm is slightly abducted. We feel for the head of the humerus in the axilla, and ascertain the exact situation of the neck of the bone. The fingers are held as shown in Fig. 38, and the frictions are made from above downward, the same precautions as regards intervening tissues being taken here as elsewhere.

Nervus Medianus.

How this nerve is found I have already described (page 616). We can easily follow it in its whole course in the upper arm;

Fig. 42.

but in trying to reach it below the bend of the elbow, we must flex the arm somewhat, as the strong fascia in front of the elbow prevents us from coming down on it.

It lies to the inner side of the biceps muscle, being separated from it by the artery. The tips of the fingers are placed just inside the tendon, and the friction made from without inward.

Nervus Musculo-Spiralis.

The place to find this nerve is where it emerges from under the outer head of the triceps muscle and in its course down between the brachialis anticus and the supinator longus (Fig. 43).

The arm is bent in order to relax the supinator longus muscle. The last phalanx of the thumb is placed at the inner border of that muscle and insinuated a little underneath it (Fig. 44).

At the same time as we quickly pronate the patient's forearm, we make the friction outward with the thumb. This goes under the muscle and over the nerve.

Nervus Posterior Interosseus of the Musculo-Spiralis.

We must first find the head of the radius. About an inch lower down, and between the radius and ulna, friction or pressure produces distinct strong pain, which is felt down to the wrist.

Nervus Ulnaris.

We must feel for this nerve where it lies in the groove behind the internal condyle of the humerus. The high bony

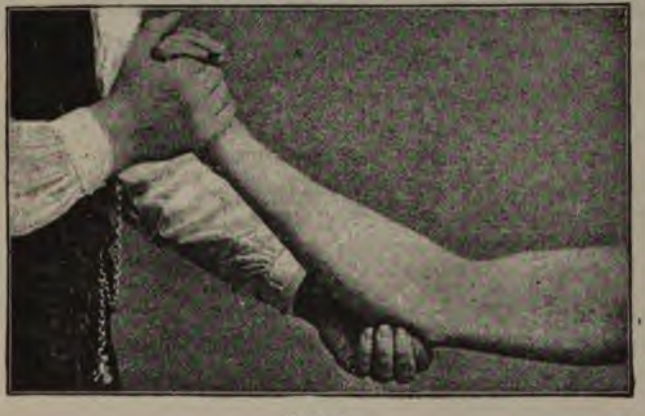

Fig 45.

edges here somewhat prevent the application of a good friction. Therefore I always give it just underneath, where the nerve lies quite free (Fig. 45).

In this case it is also better to bend the arms slightly. The tingling in the little and the ring fingers corresponds in this, as in the other nerves of the arm, exactly to its distribution.

In the hand we once more meet with the median nerve.

It comes out just below the lower edge of the anterior annular ligament, where the nerve divides into its digital branches, and

FIG. 46.

sends off the five muscular twigs. The patient's hand must be flexed. Fig. 46 shows how the friction or pressure is applied. It is felt very strongly indeed.

CHAPTER X.

PASSIVE EXTENSION OF THE MUSCLES.

THE passive extension is carried to the natural limit of the muscle, and is a passing, not a continued one. The stretching causes compression of the blood-vessels, while the nerves and the muscles are directly stimulated. After the completion of the movement, there will be an afflux of blood, and, following upon this, brisker nutritive changes. It has long been known that, if a muscle is stretched within certain limits, and not for too long a time, it becomes more sensitive to other mechanical stimulation, and contracts with greater force. In using Ling's exercises, it is therefore generally the custom to precede an active movement with passive extension, and to keep up the extension during the movement. In applying it, it is often found that apparently powerless muscles are capable of reacting against slight resistance, sometimes at once, sometimes after only a short treatment.

This passive extension stands on the borderland between passive and active movements, and at the commencement of treatment in many cases it is substituted for the latter, until strength begins to return in the affected muscles.

The expression "to keep up the extension during the movement" may seem a little extraordinary at first sight, and therefore I will try to explain it.

Suppose we have the movements of adduction and abduction of the upper arm, the patient resisting during the former, the manipulator during the latter. The shoulder-joint is the centre round which the movement takes place; the upper arm is the radius, with the elbow as the terminal point. (The forearm is supposed to be kept bent toward the upper one.) The manipulator, standing behind the patient, grasps his elbow, depresses it and stretches downward at the same time. Of course, in order to be able to do this, he does not hold his own arm at a right angle to that of the patient, but more in the

same line with it. When now the abduction begins, he does not change the respective positions of the arms to each other, or at least very slightly, but makes the resistance not at a right angle, but at a smaller one. The smaller the angle, the stronger is the extension during the movement, and the more are the muscles stimulated to contraction.

There is another reason, and an important one, why we should make it a rule, when the joint is at all affected, to use passive extension in all movements, whether passive or active under resistance. By doing so, we remove the surfaces from each other, the friction is thus lessened, and the movement which under ordinary circumstances would cause considerable pain, can be given without any; it is also greater in range, and no irritation ensues.

CHAPTER XI.

SOME OTHER PASSIVE MOVEMENTS.

THESE movements are rolling (circumduction), extension, flexion at different joints, etc. They are particularly used to diminish stiffness and to break down adhesions, etc., in joints; but it is likewise clear that they will also act more or less on the circulation, in accordance with the position the limb or part of it has while moving, and on the intermittent extension and relaxation of the veins, lymphatics, and capillary vessels in the muscles. Take, for instance, rolling of the leg (Fig. 52). If we make this movement slowly, the blood is gradually pumped toward the heart; but as the rapidity of the exercise increases, the stream quickens, the muscles are stimulated, a greater activity in the tissue interchange is produced, etc., and we have an action nearly as strong as if an active movement were made.

When pain in the joint is present, or if the patient is affected with heart disease, quickness is, of course, contra-indicated, but not otherwise. It is necessary to have the joint at which the movement takes place well under command. This is done either by the position the patient assumes, or by the hands of the manipulator. If not attended to, the movement cannot be well carried out and regulated; it becomes uncertain, and injury may be caused.

As the position of the patient and the application of the manipulator's hands are the same, or nearly so, in passive as in active extensions and flexions under resistance, with the exception of those for the head, I shall describe them along with these exercises, and confine myself here to a few rolling and some general movements for the head.

ROLLING OF THE HEAD.

The patient sits, and the operator stands at the side of him. One hand is placed on the forehead, the other below the

occiput. The head rests in the latter, which is kept nearly immovable, while the former executes the movement. The

FIG. 47.

hand placed under the occiput confines the movement almost entirely to the occipito-atlantal joint (Fig. 47).

TURNING THE HEAD FROM SIDE TO SIDE, AND BENDING IT FORWARD.

The hands have much the same position as for circumduction (Fig. 48). During the side movements both hands are

FIG. 48.

equally active, while during the one in the mesial plane, the posterior hand is principally used. Before the head is bent

forward it is slightly inclined backward. In both movements the hand on the forehead makes light vibrations. These help to accelerate the flow of blood from the head.

In all these movements the head is lifted up—well seen in Fig. 48—before the exercise commences.

The object of them is to draw the blood from the head, as well as to diminish stiffness in the neck, as, for instance, from rheumatism. They are preceded by pétrissage or nerve vibrations, as the case may require.

Rolling at the Shoulder-Joints.

The patient sits, while the operator stands behind him, and if the joint is in any way affected, the patient's back is completely steadied.

Fig. 49.

One hand is placed on the shoulder, the other below the elbow, as shown in Figs. 49 and 50.

The hand on the shoulder acts as a guard, and we can thus —say immediately after a dislocation has been reduced—give this exercise without any danger of the head of the humerus sliding out again. Then, also, when the bone is to be replaced, we press the fingers or the thumb on its head, and guide it on its course.

The movement may form part of a general treatment. The patient then sits unsupported on a low stool. The

operator places one knee between the shoulders, in order to press the chest forward, and thus produce greater expansion of it, and deeper respiration during the movement.

Fig. 50.

The patient's hands are grasped as in Fig. 63, and the elbows during such circumduction are carried well back.

Both arms are rolled at the same time.

Fig. 51.

Rolling at the Wrist-Joints.

The operator, standing in front of the patient, grasps with one hand the forearm just above the wrist, while with the other he takes hold of the patient's hand, as shown in Fig. 51,

which also demonstrates very well the strong extension made before the beginning of the movement.

Rolling at the Hip-Joint.

The patient lies in the recumbent position, or half so. With one hand we grasp the heel, the wrist and forearm passing along the sole of the foot. The other, which steadies the

Fig. 52.

knee-joint, is placed on the knee, a little to the outer side (Fig. 52)

The hand on the foot executes the movement, while the other acts as a guide.

If the hip-joint alone is to be acted upon, the circumduction need not be so wide in its range; but should we wish to affect the knee-joint as well, or if given for the leg in general, then there must be complete extension at the knee-joint between each individual rolling.

Rolling at the Ankle-Joint.

The patient's leg is so placed over the operator's knee, that the ankle-joint comes just over it. If now we grasp the malleoli with one hand, it is clear that we have complete control over the joint. The second hand makes the rolling, having the position on the foot shown in Fig. 53.

Fig. 54 shows where we apply our fingers when passive movements are made at the metacarpo-phalangeal joints. If, instead of taking hold of the forefingers by the first phalanx,

Fig. 53.

we grasped it by the tip, we would then have two intervening joints uncommanded, and this would be a great weakness and disadvantage.

The number of times these movements must be made,

Fig. 54.

varies with the part, and also with the condition of the joints. It will be apparent that we cannot roll the head round as many times as an arm or leg, and the latter not so frequently

in acute as in chronic affections, or when the rolling forms part of a general treatment.

Whenever we use these circumduction exercises, or extension and flexion, we must always carry out each individual movement to the utmost possible limit, exception being made in the instance of the head.

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(*b*) Those in which the patient resists.

The second group of movements, as can readily be understood, may be made to alternate for the same muscles, as for instance in the case of flexion and extension of the forearm on the upper, when the operator makes resistance to the bending and the patient to the stretching of the forearm.

It is necessary, before the commencement of each movement, that the patient should take up a correct position. By that I do not only mean a position in which the exercise can be best executed, but also one in which the chest is free, while deep and steady respiration must be kept up. In the movements, for instance, with the arms, depicted in Figs. 62 and 63, the respiration must be so regulated that deep inspiration is made when the arms are separated from the chest, and expiration when they are again approximated to it, because in the former case the chest is expanded, in the latter its capacity is diminished.

Simultaneously with the quickening of the circulation, a greater amount of blood is sent to the lungs, carrying with it more carbonic acid; and the need for oxygen in the body is greater, thus necessitating stronger and deeper respiration.

Indeed, a correct position is nearly of as much importance as the movement itself.

Every active exercise must be made, or given, slowly, exception being taken in those movements by which we desire, through their very rapidity, to influence the circulation. After the completion of a movement—say stretching of the arms—the patient remains for a few seconds with them in that position, in order that as great an effect as possible may be produced.

We must also bear in mind that the muscular power is strongest at the middle, smallest at the beginning and end, of the movement; and therefore the resistance must be graduated, and must increase and decrease with the increase and decrease of the muscular power.

In the free active movements, there is little or no isolation of the muscles, but in the bound ones we can, of course, localize them as much as we like.

The active movements are usually repeated three or four times.

I now pass on to describe a few of these exercises.

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ment begins and passes as gradually upward. In this way the muscular slips of the deeper muscles of the back come fully into play, and they act like so many elastic strings, which, having the weight (the head and arms) at the upper end, and a fixed point below from which their band action starts, must, when the movement goes forward, necessarily extend the spine more completely, and in a case of lateral curvature of the back also rotate the vertebræ. The patient has then to try to keep as much as possible in the mesial plane, in order that the elongated tongues of the relaxed muscles may come more effectively in action.

The patient on rising up does not stop at the erect position, but goes somewhat backward, partly in order to get a deeper inspiration, partly to exercise the abdominal muscles, and in this manner to get equality between the antagonists.

A very simple, but none the less effective respiratory movement is this: The patient stands completely erect, with the arms down to the sides. He now makes the following exercise: He carries the arms slowly forward and upward, always maintaining the proper distance between the hands, and when they are in the vertical position he draws them backward by bringing the muscles of the shoulders more strongly into play. Slowly as they were carried up, they are now taken downward and outward. As the arms are raised from the sides, the chest becomes more and more expanded. The patient has to make deep inspiration while the movement progresses toward its climax, and afterward makes gradual expiration. This movement, when well executed, is felt very strongly in the shoulder muscles. It is therefore also indicated for those whose shoulders have a tendency to fall forward, as well as for chronic disorders of the lungs.

II. BOUND.

A. With Help of Apparatus.

BENDING BACKWARD AT THE UPPER PART OF THE BACK.

The patient stands at a distance somewhat less than the length of his own foot from the wall. He places his hands on his hips, with his elbows well thrown back. Then he stretches himself and bends backward. When the movement cannot be continued any further, the patient falls back until the back

of his head touches the wall by which he stands (Fig. 56). Then he slowly rises up on his toes, and while doing so draws a deep inspiration and goes slowly down again.

The movement does not take place in the lumbar region at all, but higher up between the shoulders. We have to do with movable rings, each formed by a vertebra and a pair of ribs. As now the spinal processes are by the backward bending, small as it is, approximated to each other, the freer segments

Fig. 56.

of the rings must come further away and widen the interspaces. The chest becomes greatly expanded, and the exercise is thus a powerful respiratory movement.

Stretching and Bending of the Knee.

The patient places one foot against the seat of a chair, and with his hands he takes hold of the back of it (Fig. 57). The correct position, however, is with the arms straight forward from the shoulders, and with the hands grasping some fixed object at the same level. Why should the arms be stretched horizontally forward? Because the patient then stands erect, and we have the normal distance between the two attachments of the hamstring muscles. In Fig. 57 this distance is

increased because of the bending forward. As we see, this may serve as a position in which to give tapotement of the perineum, sacral and gluteal regions. The operator, while giving this tapotement, stands on the opposite side to that of the raised leg. In such a case, therefore, as represented in Fig. 57, he would take up his position on the left side.

When the knee-joint is stiff, he must be on the same side as the affected limb. The patient has to stretch the leg to the

FIG. 57.

utmost of his ability, and when he has reached the limit, we produce a greater extension at the knee-joint by laying one hand on it, placing the other below the buttock, and by drawing backward we extend passively the hamstring muscles, at the same time as the hand on the knee presses it down. I have often seen a knee stretched completely straight, where from stiffness in the muscles the patient himself was entirely unable to effect this movement.

The patient keeps it extended for a little, and then he bends it until thigh and leg are at least at right angles to each other, and complete relaxation of the muscles is produced. Sometimes, of course, we must begin with the foot, quite low down at the floor, and gradually work upward as the patient

improves, until he can straighten his knee, when the foot is placed at the same height as the hip-joint.

The action on the muscles, blood-vessels, and nerves on the posterior part of the thigh and leg—particularly on the former—is very great. The effect of the movement, especially on the muscles of the calf, is much increased by depressing the heel after the knee has been extended.

The limb in which the patient stands must be kept completely straight, otherwise the exercise loses a good deal of its effect.

This movement is more especially used in contraction of the hamstring muscles and those of the calf, stiffness and other affections of the knee-joint, in sciatica, and also for the purpose of relaxation.

Extension of the Muscles of the Calf.

In standing with the legs straight, we make strong dorsiflexion of the foot, the muscles of the calf are extended, and

Fig. 38.

the movement goes on until it is stopped, partly by the wedging of the astragalus between the malleoli, and partly by the

band action of the muscles of the calf. We can increase the intensity of this movement by placing the foot against, say, a wall at an angle of 45°, or on something situated at the same angle, and then with straight knee moving the whole body forward (Fig. 58). The extension is felt very strongly in the muscles of the calf. If the knee is bent, the movement loses its effect, because the points of attachment of the muscles become approximated to each other.

The movement is mostly employed for muscular and nervous stimulations, and for stiffness in the ankle-joint.

Raising of the Legs or Trunk while Lying on the Back (Figs. 59, 60).

We have here two movements shown in full action, in which the psoas and iliacus muscles take the principal part,

Fig. 59.

but in which the muscles of the lower extremities are also at work—only the fixed point is reversed. The primary position for the patient is to lie straight on his back. In Fig. 59 he lifts the legs up to a right angle or more. In Fig. 60 he gradually raises the trunk until he attains a sitting position. In the exercise depicted in Fig. 59 we sometimes steady the patient by laying our hands on the elbows, while in the raising of the trunk the hands grasp the ankles; and in both we isolate the psoas and iliacus muscles by deep abdominal respiration.

That full respiration is necessary we can readily understand, for the muscles of the lower extremity are more or less in action, keeping the knee and ankle steady, so that the psoas and iliacus may have an immovable attachment from which to start their action. In doing so, they for the time compress the vessels, and the blood is largely driven out of the limbs. If now, as so often happens, the patient holds his breath, the blood does not pass so well into the lungs, and the abdominal muscles adding their pressure, the right side of the heart gets overfilled with venous blood. Thus we have also backward pressure in the vessels of the head and neck.

FIG. 60.

The movements are made very slowly, and in both we make the patient stop at different angles to the plane in which he lies. This greatly increases the muscular work.

We can, in the movement shown in Fig. 60, augment the work by folding the hands behind the neck, and again by having the arms stretched straight up. The patients, when they begin to feel tired of continuing the exercise, have a habit of drawing the shoulders forward and thus pressing the chest together. This is on no account to be allowed.

These exercises are to be used in weakness and pain in the lumbar region. They also act on the organs in the abdominal cavity.

In the position the patient occupies in Fig. 59, a movement acting on the adductor muscles of the thigh can easily be made simply by letting the legs slowly fall outward as far as

possible from one another, and then by as slowly approximating them again.

Extension of Back in the Prone Position.

In Fig. 61 we see a movement which acts especially on the muscles of the back, but also on those on the posterior aspect of the lower extremity. The patient lies in the prone position, with the hands steadied at the hips, the fingers forward and the thumbs backward. If they are reversed, they necessitate the carrying forward of the shoulders, and with that compression of the chest. On the contrary, the shoulders are to be

Fig. 61.

well thrown back and deep inspiration made, as it is not only a movement for the back, but, secondarily, also for the chest.

It is used after tapotement of the back, or alone as a muscular stimulation, and in a general treatment.

As the patient gets accustomed to the exercise, the hands are applied to the neck, or extended straight forward parallel with the ears.

B. Made under Resistance either from Patient or Operator.

Bending and Stretching of the Neck.

The patient stands quite erect, with his hands steadied against the wall of the room. The operator places his hands well below the base of the patient's head, having the thenar part of the palm on each side behind the mastoid process, and

AND BACKWARD IN THE PLANE.

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The patient carries the arms back under resistance, and resists himself when the arms are brought forward by the operator.

As we see from the course of the movement, it acts more especially on the muscles passing between the shoulder-blades and the humerus, but since the rhomboid and trapezius muscles, starting from the spine, are nearly as much exerted in order to give the other muscles a steady point to work from, the action of the movement has a marked influence upon them too.

Made with both arms at the same time, it is distinctly a

Fig. 63.

movement for the chest, by its action of drawing the shoulders back, and by that of lifting up the thorax. Made with one arm at a time, correction of the rotation in lateral curvatures of the spine is produced.

Stretching and Bending of the Arms.

The patient sits on a low stool. The operator places his knee against the patient's back between the shoulders, partly to steady him, partly for expansion of the chest. Fig. 64 shows the grasp of the hands, the turning out of the elbows, and consequent throwing back of the shoulders. The patient stretches the arms straight up and draws them down again, the operator making resistance on both occasions.

At the same time that it is a movement for the arms, it also affects the chest by producing greater expansion.

FIG. 64.

STRETCHING AND BENDING AT THE ELBOW-JOINT.

The patient sits or stands. With one hand we grasp the elbow, in order to command that joint, and with the other the hand and wrist, as seen in Fig. 65.

FIG. 65.

Here the movement is shown with the arm midway between supination and pronation, in order that the supinator longus muscle may more particularly be put in action. We make the resistance both at the bending and stretching, or the patient makes the resistance in both movements.

Used for stiffness of the elbow-joint, muscular stimulation, etc.

Stretching and Bending at the Knee-Joint.

The operator places the patient's knee above his own thigh, and lays one hand over that joint, and the other over the

Fig. 66.

dorsum of the foot (Fig. 66). The patient extends and flexes his leg, while the operator makes resistance. During the flexion of the limb, the hand on the dorsum of the foot is placed behind the heel and ankle-joint.

Stretching of the Vertebral Column.

I cannot remember having seen this movement used in Stockholm, but my brother always employs it in curvatures of the spine.

The patient stands as erect as possible, with his back against the wall of the room (Fig. 67). The operator stands in front of him, and lays one hand on the patient's head, while with the other he steadies him. (The left hand in the figure is somewhat awkwardly placed.) He now presses downward, at the same time that the patient is told to stretch upward with all his might. The top of the column being thus fixed, the short deep muscles at the upper part of the back take

Fig. 67.

their steady point above, and so act from above downward while the lower ones work from below upward.

In a case of spinal curvature, the slips of the deeper dorsal muscles, which have become weakened and elongated, are thus brought into action. We must take care not to bend the head forward during the exercise, as the movement then entirely loses its effect, because the fixed point above is moved.

Turning of the Trunk in the Sitting Posture.

The patient sits on a low stool. Either he must have the feet fixed by some means, or an assistant must steady his

knees; otherwise the movement is not confined to the trunk. He has the hands folded behind the neck, sits with his back completely straight, and with the head well back. The operator applies his hands to the patient's elbows (Fig. 68).

The movement now begins, the patient turning toward either side (the left in the figure), and resistance is made by the operator with the left hand behind and the right one in front. This resistance must be equal on both sides. When

Fig. 68.

the patient has gone round as far as he can, he turns forward again, also under resistance, which, however, has changed, being in front on the left side and behind on the right. When he again sits with the face straight forward, a few seconds' rest is made, and the same repeated on the other side.

If we recall the arrangement of the muscles of the trunk, we shall understand how wide the effect of this exercise really is. Starting below at the crest of the ilium on the right, the fibres of the external oblique of the abdomen pass upward and backward. In the region of the thorax this same direction is maintained by the external intercostal muscles; still further

back there is a similar arrangement in the short fibres which constitute the great oblique rotator muscles of the spine; and we must also remember that in front we have the internal oblique and internal intercostals on the left side whose fibres run in the same direction as those of the external muscles of the right.

Besides using the exercise for circulatory purposes and for the muscles, we have recourse to it in different intestinal affections.

It will be clear that we can also give passive movements to the patient going in the same direction and with the same application of the hand, in all the above positions, except the stretching of the back.

Lifting of the Leg while Lying on the Side.

In Fig. 69 we see the position the patient takes up before the exercise begins. Fig. 70 shows how the movement is made under resistance. The operator stands with his side

Fig. 69.

against the patient, steadying him at the gluteal region. With one hand he grasps the heel and ankle in such a manner that the thumb lies parallel to the outer border of the foot. The other hand is placed on the knee. The patient, holding the leg completely straight, lifts it slowly up in the middle line

as high as he can, while the operator makes resistance. The latter afterward presses it down, the patient resisting. If we

Fig. 70.

carry the foot a little backward or a little forward, we bring the anterior and the posterior parts of the muscular mass in the gluteal region into play to a greater extent.

Abduction of the Knees (Fig. 71).

The patient lies in the semi-recumbent position, the knees being bent and the feet resting at the same level as the buttocks. The operator stands in front of the patient, and places one hand on the outer side of each knee. The patient abducts the thigh under resistance from the operator, and the latter afterward adducts the knees while the patient resists. In this way the abductors of the thighs are strongly acted upon. One must stand in front of the patient in order to produce extension of the muscles.

In the same position the adductor muscles of the thighs can also be exercised if resistance be made on the inner side of the knees when they are approximated to each other, or if the operator adducts the knees, the patient making resistance.

The intensity of the movements is increased when the patient sits on a high bench with the back steadied and the legs stretched out. The operator's hands are then applied on

the feet instead of the knees. The increased length of the lever increases the muscular work for the patient, while at

FIG. 71.

the same time it lessens the force necessary to be exerted by the operator.

CHAPTER XIII.

CASES ILLUSTRATING THE TREATMENT.

I. Parotitis Bilateralis.

Artilleryman N. was taken under treatment on the 17th of December, 1888.

The parotid glands on both sides were swollen, the swelling extending from the zygomatic arch to below the lower jaw. They were hard and painful, and had the size of a hen's egg. The pain was so great that the patient was unable to open his mouth. Hearing impaired. The illness commenced on the previous day.

Progress.—After about twenty minutes' treatment, the glands sank to within a third of their former volume, and were soft.

December 18th. Pain and swelling less than after treatment the day before.

December 19th. Hears well again; no pain, no swelling; movement of lower jaw painless and free.

Treatment.—Pétrissage. The pressure was applied in a half circle, from above backward and downward. I stood behind the patient, and used the ball of the thumbs, in order that no unnecessary pain should be caused. The pétrissage did not act quickly enough, and therefore vibrations were made with the same parts of my hands, which had a greater effect in diminishing not only the pain, but also the swelling. I also gave frictions over the facial nerve for about a minute.

II. Tonsillitis.

Rinaldo N., 22 years old, non-commissioned officer of the I. and R. Navy, came for treatment on the 11th December, 1888.

Both tonsils began to swell the day before. They were now covered with pus. On the right side, the pus coverings extended over wide areas, while on the left side they formed

several smaller points. The tonsils themselves were very swollen, and difficulty and pain were experienced in swallowing.

Progress.—After the treatment the patient felt better. The difficulty of swallowing was greatly lessened.

December 12th. Tonsils much smaller. The pus coverings have disappeared on both sides.

December 13th. The tonsils are very nearly normal. No difficulty or pain in deglutition. Treated for the last time.

Treatment.—The patient was subjected to treatment for fifteen minutes each day. It consisted in the two movements for the throat shown in Figs. 20 and 23, the former for five, the latter for about ten minutes, and frictions over the facial nerve separately; but it is clear that the manipulation behind the ascending ramus of the lower jaw stimulates the nerve the whole time, since the fingers pass over it continually.

III. Tonsillitis.

Rezie, 28 years old, maid-servant, residing at Trieste, had taken cold on the first day of her menstrual period, the 22d of January, 1889. On that day and during the night, fever, with shivering, difficulty of and pain in swallowing, set in. She also suffered from a severe headache.

She was under the care of Dr. Michele Brown, the distinguished specialist for diseases of the nose, throat, and larynx.

I myself was under his treatment at Trieste. He mentioned the case to me on the morning of the 23d, and asked if I would treat her, and thus illustrate to him the way in which I gave the manipulations for the throat.

The patient's temperature was 39° C. She shivered and felt cold, and had great pain in swallowing; both tonsils were inflamed, each with a continuous white covering, more especially on the right side. The skin was dry and hot, the head ached very much, and the lymphatic glands were enlarged.

Progress and Treatment.—January 23d. I gave the shakings as shown in Figs. 20–23 for about five minutes each, and the pain and difficulty of swallowing passed nearly away; also frictions for three minutes in the neck, more particularly over the second pair of cervical nerves. The patient felt the cold sensation, which nearly always accompanies administration of these frictions, very strongly. The shivering ceased,

she turned warm, and the skin moist. This was followed by general pétrissage of the abdomen.

In the evening at six o'clock the temperature was 38.6° C.; pulse, 132. Same treatment as in the morning. The pulse immediately went down to 96. She now also told me that she had severe pains in the sacral region, and that she had had them very strongly at the menstrual periods since the time, six months previously, when she had a child. I gave nerve frictions over the sacrum, with the consequence that the pain entirely passed away.

January 24th. Not treated in the morning. The pain on swallowing had diminished considerably. Up to ten o'clock the evening before, she had felt well, but at that hour the fever set in again.

Dr. Brown took the temperature an hour after the treatment the preceding night, and found it normal. This sudden effect astonished him, and he asked Dr. Escher and Dr. Gormond, the former surgeon and the latter physician to the Infirmary at Trieste, to be present at my next visit. We decided to treat the patient in the evening only at six o'clock.

The pulse had again risen to 122, and the temperature was 38° C. I gave the same treatment as the day before. The pain in the throat went entirely away. I gave the nerve frictions in the neck for two minutes. Dr. Escher and Dr. Gormond each took one hand, and felt the pulse during the frictions. They said that at first it changed, being sometimes slower, sometimes quicker, then it got more even, and at the expiration of the two minutes it went comparatively slowly, at the rate of 90 beats a minute.

An hour afterward the temperature was again normal. The patient felt easy and well; the pain at the small of her back remained away.

January 25th. The patient was well. No discomfort on swallowing. Tonsils no longer inflamed; the coverings gone. Temperature normal; pulse, 72. Treated for the last time.

IV. Diphtheria.

Private Ine F. turned ill on the 10th of December, 1888, and was the same day removed to the Marine Infirmary.

On the 11th, at four o'clock in the afternoon, I saw him for the first time.

The tonsils were very much swollen—the right one most; they nearly met in the middle. The right tonsil was covered with a large gangrenous membrane; on the left the covering was smaller. The lymphatic and submaxillary glands were enlarged, especially on the right side, where they formed a large continuous swelling. Deglutition extremely painful. Temperature, 39.6° C.; pulse, 104.

Progress.—The treatment was begun at once. The swelling of the glands diminished visibly, and they turned softer. 9 P.M. The diffuse swelling is soft and œdematous. The patient complains that the sputum and fluids he drinks pass out through the nose. He keeps the mouth very open. Temperature, 38.7° C.; pulse, 92.

After the treatment the external swelling had nearly disappeared. Expectoration easier; he closes the mouth, and says he feels better.

December 13th. Morning temperature, 37.7° C. The swelling of the tonsil on the right side diminished, and the membranous covering smaller; the left side is also clearer.

December 14th. Membranous covering continues to diminish. Temperature, 37.3° C.

December 16th. Deglutition easier, but the fluids still pass out of his nose on drinking.

December 17th. On left tonsil the covering loosens; the tonsils much smaller; lymphatic glands normal.

December 20th. Pharyngeal surfaces normal. Patient well and convalescent.

On the 30th, the patient left the hospital, and went on three weeks' leave. He came back from this with paralytic symptoms. These spread, bulbar paralysis set in, and on the afternoon of the 2d of February, 1889, the patient died from paralysis of the heart—the very day I returned to Pola after a five weeks' absence.

V. Diphtheria.

The girl Papic, 8 years old. On the 9th of December, 1888, the tonsils were red and swollen, and had a membranous covering.

December 10th. Membrane on both tonsils. Fever; glands swollen.

December 11th. The membranous covering spreading.

Progress.—December 12th. She came under my hands. The temperature, 37.7° C.; pulse, 110. She keeps the mouth open; breathing snoring, expression of face quiet. The tonsils very swollen, especially the left one, so that they nearly meet. The membranous covering passes on to the soft palate. The nose is free. On the left side the lymphatic glands are as large as hazel-nuts, on the right as almonds; the submaxillary glands are swollen—all are tender.

Evening, nine o'clock. Temperature, 37.4° C.; pulse, 92. Treated both in the morning and evening for about 20 minutes.

December 13th. Yesterday the membranous coverings were brushed away with lactic acid. To-day they are more continuous and thicker, and are spreading forward on the left side; on the right side, the covering shows on separate places. Since yesterday, the fluid she drinks passes through the nose. The glands on the right side are larger; on the left, œdematous swelling is present, especially in the submaxillary region.

Evening. Temperature, 37.6° C.; pulse, 102. During the treatment a great amount of saliva flows out of the mouth. After it, the girl feels easier, the glands are softer and smaller.

December 14th. Slept fairly well during the night. Morning temperature, 37.7° C.; evening, 37.8°.

December 15th. Evening, ten o'clock. Temperature, 37.6° C.; pulse, 108. Breathing very snoring. Nose is clogged up. Expression of face apathetic. Membranous covering on right side as before. On the left, it spreads thickly over the whole tonsil, over the soft palate and on to the uvula.

The pulse intermits sometimes (every fifth or sixth beat); is very small.

The breathing occasionally stops. After thirty minutes' treatment, the pulse was quieter and was regular; same with the respiration.

December 16th. Forenoon. Temperature, 36.7° C. Slept a little during the night, but snored very much. From the nose a great amount of thick stuff came out. Expression of face quiet; she takes an interest in the surroundings. Breathing free; the nose free.

Membranes on right side thrown off. Tonsil on the left less swollen; membrane contracted and lessened, split in the middle and at several places. The glands are much smaller. Treated 20 minutes.

December 17th. Morning. Temperature, 37° C. Slept well; no snoring after two o'clock. Perspired slightly during the night. Left tonsil free at the front; left palate near it the same; the covering on uvula loosens, same posteriorly; right tonsil clear.

Evening temperature, 37° C. Treated 25 minutes.

December 18th. Has slept well; plays and takes food with appetite. Temperature, 37.2° C. The membranous covering only present as small islands. The lymphatic and submaxillary glands are normal.

December 19th. Slept well. Œdema of the right inferior eyelid. Albumin in urine, 1%. Quantity of urine small. General condition yet continues good; she plays. Treatment 35 minutes. Œdema gone.

Evening. No œdema. The child plays and laughs.

December 20th. The remainder of the membrane on left side hangs free as a sail from the tonsil. Temperature, 37.6° C. Treated 35 minutes; the throat, 15 minutes; back and abdomen during the rest of the time.

December 21st. Urine has 1% albumin. Membrane completely gone. Treatment as before.

December 22d. Urine still contains albumin. Throat treated 10 minutes, with pétrissage of the abdomen. I also gave vibrations over the kidneys.

December 23d. Urine contains albumin in the proportion of about 1 to a thousand. Quantity greater. Child looks well.

December 24th. Quantity of urine about normal. Traces of albumin scarcely discernible.

Here I stopped the treatment. On the 6th of January, 1889, the patient was sent home.

Treatment.—The treatment is here the same as for angina (tonsillitis), only vibrations are at the beginning substituted for shakings, and the latter must be made much more delicately. The nerve frictions in the neck are continued for some minutes. The whole is to be concluded with general pétrissage of the abdomen, accompanied by nerve frictions over the dorsal sensory nerves.

In the case of the girl Papic, I gave on the first days of the appearance of albumin in the urine kneading of the kidneys. On the 22d I gave vibrations instead, and on the following day

the quantity of urine was increased and the albumin diminished. The treatment in both cases lasted from twenty-five to thirty-five minutes, and the patients were treated twice a day.

VI. Post-Diphtheritic Paralysis.

I treated the following case during the summer of 1887, at Leipsic, in the clinic of Dr. Moebius, the well-known authority on nervous diseases; and I have already recorded it in the medical press ("Medical Press and Circular," July 25th, 1888).

Mary A., aged 15, a native of Leipsic, was seized with diphtheria in the second week of December, 1886, and was for four weeks confined to her bed. On several occasions she was nearly choked, and her mother probably saved her life by tearing away large pieces (grosse Stücke weggerissen) with a spoon. A young member of the family, a boy, three years old, died of diphtheria at that time. The patient's progress toward recovery was very slow. She could not go out of doors until the middle of February, 1887. The soft palate remained paralyzed for a considerable time. Even in May and June regurgitation of food into the nose now and then occurred.

About the middle of May, the patient began to feel weakness in the legs, and consequently difficulty in walking. She was sent into the country, but returned after a fortnight in a worse condition. The weakness increased day by day, until at last she was quite unable to walk without assistance. Her doctor then advised her to consult Dr. Moebius, and she attended his clinic on the 23d of June, 1887. Her condition on that day, shortly stated, was as follows:

The patient looked pale and weak. Her appetite was not good. She was very nervous, and shed tears on the slightest provocation. Sensation in the feet, ankles, and lower parts of the legs was greatly impaired. The weakness in the legs was not preceded or accompanied by any pain. She could only take a few steps without help, and even these in a very waddling manner. She lost her balance in walking, and also when she closed her eyes.

When told to extend or bend her feet, she only succeeded in producing slight movements of the toes. The powers of

flexion and extension at the knee-joint were gone. Adduction of the thighs could be performed with some exertion, while the abductor muscles had almost lost their power. She required assistance to rise from her chair, or while standing with her feet wide apart to bend her body forward or sideways and raise it up again; her inability being due partly to loss of balance, partly to muscular weakness. The patellar reflex was absent. Her sight had been affected, but the power of accommodation was now normal. The voice had a slight nasal twang, and, as said before, regurgitation of food into the nose had sometimes occurred during the month. No electrical tests were tried.

Progress.—From June 23d to July 2d I treated the patient four times. By the latter date the sensation was greatly improved, and there was more strength in the back. The feet had regained some power, but she was still unable to perform the movements of eversion and inversion.

July 9th. The patient had received further four treatments. The sensation in feet and legs was completely restored. She could bend and extend feet and legs even under slight resistance on my part. The power of eversion and inversion was returning. She could walk without assistance, and with a much steadier and less waddling gait. No regurgitation of food had occurred since she came under my treatment.

July 16th. The patient had again been treated four times. On the 14th she walked a considerable part of the way to the clinic without help, and also walked up three flights of stairs, whereas previously she had to be carried up. Her voice had lost the nasal accent, and the general appearance was greatly improved.

July 23d. Treated three times since last report. During the last few days she had experienced some pain in the ankles and knees, because she had passed a good deal of time out of doors. She had also felt a prickling sensation in the throat toward the ears. By the above date these symptoms had disappeared. She could turn round without staggering, and walked well.

August 2d. The patient was treated three times during the preceding week, and on this occasion she had walked unassisted from her home to the clinic, and back again—in all

about an English mile and a quarter. She had regained her strength, and made all the movements well. Those at the ankle and knee-joint were executed with considerable force. She could stand quite steady with her eyes closed. She both looked and felt perfectly well, and could now be considered restored to health.

The patient had no treatment during the week following the 2d August, as I was away from Leipsic. She came again and was treated on the 9th, the 12th, and for the last time on the 16th, when she was dismissed as cured.

The patellar reflex had not returned, but, according to Dr. Moebius's experience, this generally does not appear until some time after the restoration of the muscular power.

On each occasion the patient was treated from half an hour to three-quarters of an hour.

From advices which I received up to the end of 1887, I was glad to learn that the patient continued in perfect health.

Treatment.—Each day of treatment I gave her the shakings for the throat (Figs. 20–23) with frictions over the facial nerve; pétrissage of the legs and gluteal region, and tapotement of the back—both accompanied by nerve frictions; and succeeding that other passive and then active movements, as seen in Figs. 55, 57, 68, etc.

In order to remove the waddling walk, I gave the movement shown in Fig. 71.

VII. Neuralgia in the Right Frontal Region.

Gendarme-Sergeant Stanislaus R., 31 years of age, entered the Marine Hospital, Pola, on the 11th of December, 1888.

A year before, the patient had malaria, which left behind an intermittent neuralgia. He now complained of severe pain in the right frontal region, which had continued for several days.

He was treated for about ten minutes, when the pain disappeared.

Progress.—December 12th. Yesterday afternoon he felt slight pain for about an hour.

December 13th. Had no pain the day before.

Up to the 17th felt quite well. On that day he was dismissed as cured.

Treatment.—Frictions over the supraorbital nerve, and over the second cervical pair of nerves, produced sharp pain exactly at the place in the head where the patient suffered most. These nerves were treated—the first one with vibrations in the centripetal direction, the latter pair with light frictions and constant pressure. The patient was subjected to this treatment for ten minutes every morning.

VIII. Sciatica.

Joseph Scopac, sailor, 23 years old, contracted a gonorrhœa on the 18th of June, 1888. On the 5th of July cystitis set in; on the 2d August, pain in the left gluteal region; on the 28th August, conjunctivitis (left eye); 29th August, ciliary injection; 31st August, œdema palpebrarum; 1st September, iritis with bleeding into the anterior chamber and dimness of the cornea; 5th September, intra-ocular pressure decreased; 8th September, pain in left leg; 20th September, in left ankle; 5th October, pain in the neck.

The patient says that when the pain in the eyes increases, it also gets worse in the leg; 15th October, the ciliary injection decreased; 22d October, the glands in the neck and groin were swollen, and there were white patches on the tonsils. For these, mercurial ointment and iodide of potash were prescribed.

On December 6th the patient complained of pains in the left hip-joint, and especially in the middle, between the trochanter major and the tuber ischii; muscular weakness which caused waddling toward left side when walking. Lying on the right side, he could not lift the left leg in the least without help.

On the left eye there was immobility of the pupil; dimness of the lens; the fingers could scarcely be counted at a distance of 2 metres; small ciliary injection on the lateral edge of the cornea.

On the right eye the papilla and surrounding parts were red, and could hardly be distinguished from each other. No pains; sight good.

The treatment was started on the 6th December.

Progress.—December 10th. No pain, only weakness in the leg, which makes the walk difficult. Ciliary injection gone.

CHAPTER XIII.

CASES ILLUSTRATING THE TREATMENT.

I. Parotitis Bilateralis.

Artilleryman N. was taken under treatment on the 17th of December, 1888.

The parotid glands on both sides were swollen, the swelling extending from the zygomatic arch to below the lower jaw. They were hard and painful, and had the size of a hen's egg. The pain was so great that the patient was unable to open his mouth. Hearing impaired. The illness commenced on the previous day.

Progress.—After about twenty minutes' treatment, the glands sank to within a third of their former volume, and were soft.

December 18th. Pain and swelling less than after treatment the day before.

December 19th. Hears well again; no pain, no swelling; movement of lower jaw painless and free.

Treatment.—Pétrissage. The pressure was applied in a half circle, from above backward and downward. I stood behind the patient, and used the ball of the thumbs, in order that no unnecessary pain should be caused. The pétrissage did not act quickly enough, and therefore vibrations were made with the same parts of my hands, which had a greater effect in diminishing not only the pain, but also the swelling. I also gave frictions over the facial nerve for about a minute.

II. Tonsillitis.

Rinaldo N., 22 years old, non-commissioned officer of the I. and R. Navy, came for treatment on the 11th December, 1888.

Both tonsils began to swell the day before. They were now covered with pus. On the right side, the pus coverings extended over wide areas, while on the left side they formed

several smaller points. The tonsils themselves were very swollen, and difficulty and pain were experienced in swallowing.

Progress.—After the treatment the patient felt better. The difficulty of swallowing was greatly lessened.

December 12th. Tonsils much smaller. The pus coverings have disappeared on both sides.

December 13th. The tonsils are very nearly normal. No difficulty or pain in deglutition. Treated for the last time.

Treatment.—The patient was subjected to treatment for fifteen minutes each day. It consisted in the two movements for the throat shown in Figs. 20 and 23, the former for five, the latter for about ten minutes, and frictions over the facial nerve separately; but it is clear that the manipulation behind the ascending ramus of the lower jaw stimulates the nerve the whole time, since the fingers pass over it continually.

III. Tonsillitis.

Rezie, 28 years old, maid-servant, residing at Trieste, had taken cold on the first day of her menstrual period, the 22d of January, 1889. On that day and during the night, fever, with shivering, difficulty of and pain in swallowing, set in. She also suffered from a severe headache.

She was under the care of Dr. Michele Brown, the distinguished specialist for diseases of the nose, throat, and larynx.

I myself was under his treatment at Trieste. He mentioned the case to me on the morning of the 23d, and asked if I would treat her, and thus illustrate to him the way in which I gave the manipulations for the throat.

The patient's temperature was 39° C. She shivered and felt cold, and had great pain in swallowing; both tonsils were inflamed, each with a continuous white covering, more especially on the right side. The skin was dry and hot, the head ached very much, and the lymphatic glands were enlarged.

Progress and Treatment.—January 23d. I gave the shakings as shown in Figs. 20–23 for about five minutes each, and the pain and difficulty of swallowing passed nearly away; also frictions for three minutes in the neck, more particularly over the second pair of cervical nerves. The patient felt the cold sensation, which nearly always accompanies administration of these frictions, very strongly. The shivering ceased,

she turned warm, and the skin moist. This was followed by general pétrissage of the abdomen.

In the evening at six o'clock the temperature was 38.6° C.; pulse, 132. Same treatment as in the morning. The pulse immediately went down to 96. She now also told me that she had severe pains in the sacral region, and that she had had them very strongly at the menstrual periods since the time, six months previously, when she had a child. I gave nerve frictions over the sacrum, with the consequence that the pain entirely passed away.

January 24th. Not treated in the morning. The pain on swallowing had diminished considerably. Up to ten o'clock the evening before, she had felt well, but at that hour the fever set in again.

Dr. Brown took the temperature an hour after the treatment the preceding night, and found it normal. This sudden effect astonished him, and he asked Dr. Escher and Dr. Gormond, the former surgeon and the latter physician to the Infirmary at Trieste, to be present at my next visit. We decided to treat the patient in the evening only at six o'clock.

The pulse had again risen to 122, and the temperature was 38° C. I gave the same treatment as the day before. The pain in the throat went entirely away. I gave the nerve frictions in the neck for two minutes. Dr. Escher and Dr. Gormond each took one hand, and felt the pulse during the frictions. They said that at first it changed, being sometimes slower, sometimes quicker, then it got more even, and at the expiration of the two minutes it went comparatively slowly, at the rate of 90 beats a minute.

An hour afterward the temperature was again normal. The patient felt easy and well; the pain at the small of her back remained away.

January 25th. The patient was well. No discomfort on swallowing. Tonsils no longer inflamed; the coverings gone. Temperature normal; pulse, 72. Treated for the last time.

IV. Diphtheria.

Private Ine F. turned ill on the 10th of December, 1888, and was the same day removed to the Marine Infirmary.

On the 11th, at four o'clock in the afternoon, I saw him for the first time.

minutes. The good effect of this procedure was quickly manifest. Treated once a day. The active movements which I gave are shown in Figs. 57, 58, 69.

The patient had no treatment on February 24th and 25th,

FIG. 72.

March 3d, 16th, 17th, 24th, 25th, 26th, 27th. He was thus treated only twenty-six times before the above result was obtained.

X. TRAUMATIC LUMBAGO AND SCIATICA IN THE RIGHT LEG.

Mr. E., 38 years of age, met with an accident in May, 1887. His horse shied just as he was in the act of mounting. The stirrup strap broke, and he was very nearly thrown off. At the moment he felt some pain in the lower part of his back, and this grew worse during the next three or four days. It gradually extended down the legs, especially the right one. He had also a feeling of heat inside the pelvis. He was treated

for about five weeks with massage in Gothenburg, and he gradually grew better. During the illness he continued riding on horseback for several hours each day. In October, 1887, while making a sudden pull to get on a riding boot, the same pain again set in. This time the pain was at its height in about four to five hours. He was again treated with massage in Gothenburg for two months, until he got quite well.

Present History.—On the 8th of February, 1888, he lifted a very heavy weight. He felt some little pain in the lumbar region at the same place as before, and this increased until Tuesday, the 14th, when the patient had great difficulty in walking, moving the back, or standing. When he had been in any one position for a little time (*e.g.*, standing, sitting, or lying) he could only change it with the greatest difficulty and pain.

The right leg could not be stretched properly at the knee-joint. The neuralgia in the ischias was of a sharp shooting nature, and felt most in the gluteal region between the great trochanter and the tuber ischii, in the popliteal space, and the back of the leg, somewhat to its inner side. There was also a feeling of cold radiating from each side of the coccyx over the gluteal regions. The sensory nerves over the sacrum were very sensitive to pressure and friction.

Progress.—On Tuesday, the 14th, I began the treatment. The pain was relieved after the manipulation, as also on the following day; but at night he caught a severe cold, and the pain was greater than ever.

February 15th, 16th, 17th. Treated twice on each of these days. On the last he was sufficiently recovered to be out all the evening.

February 26th. The pain in the back had nearly disappeared. In the ischias and other branches of the sacral nerves plexus, the pain still returned after long walks.

March 3d. The stiffness in the leg nearly gone. Can walk without difficulty and pain.

March 10th. Not treated on the 4th, 5th, and 6th, as he had been travelling about sightseeing, which means much walking; but still he felt well all the time. The treatment was continued for another week.

Treatment.—Frictions over the ischias and sacral sensory branches, pétrissage over the lumbar region, and vibrations

over the more sensitive places. Active movements from the very first day, as in Figs. 56, 71.

The exercise shown in Fig. 56 had to be begun at the floor with the toes steadied against the wall, and when the treatment finished it was made at normal height, with the heel as high up as the buttock.

XI. Rheumatic Lumbago.

F., 32 years old, Captain in the Imperial Austrian Navy, caught cold after a steam bath, on the 15th December, 1888. On the 17th he came up to the Marine Hospital.

He complained of pain in the whole lumbar region, radiating down over the gluteal regions. On examination it was found that the pain was greatest on a level with the transverse processes of the fourth lumbar vertebra. He could not undress unaided, could not walk straight, and could not bend the back. He had for over a year suffered more or less from rheumatism.

Progress.—After the first treatment the patient could move freely, and the pain ceased.

December 18th. Yesterday, toward evening, the pain came back, but was not so violent as before. After the treatment to-day it again ceased.

December 19th. The pain did not reappear. Could jump over the operation table after the treatment.

December 20th, 21st, 22d. The back was completely free from pain; all movements easy. Treatment stopped.

On the 21st, the patient complained of pain over the metatarso-phalangeal joint of the little toe. There was a dark red swelling, one inch long and half an inch broad, which was very tender to the touch. During the last few days we had had very cold weather, which had occasioned this frost-bite. After the treatment, which consisted of pétrissage and vibrations, the pain and the tension were greatly diminished.

December 22d. No tension; pain only on strong pressure.

The patient was treated for about a quarter of an hour once a day. The frost-bite was manipulated for a few minutes.

XII. Traumatic and Rheumatic Lumbago.

Dèlise, 42 years old, working man at the Naval Arsenal, Pola, came under my treatment on the 10th of February, 1889.

The patient had, during the month of May, 1888, lifted a heavy piece of iron, and had broken down under the weight. He then felt some pain in the lumbar region of the back. He continued working, although the pain gradually grew worse. He also caught cold, and this, too, settled in his back. He was in a very short time unfit for heavy labor, and only light work was given him.

After a few weeks, in the month of June, he could not go on with this either, because of the severe pain in his back, not only on moving it, but also when quiet. He was treated by several physicians in private practice, both at Pola and Trieste, but none of them could give him relief. In October, 1888, he entered the Marine Hospital, and after some weeks got rather better, when he left. Soon the pains set in again with their former intensity, and they became so severe that he was unable to obtain any sleep during the night, and entirely lost his appetite. He re-entered the hospital, and I was asked to treat him.

On the 10th of February his condition was as follows:

The patient looked very pale and worn, the cheeks were deeply sunken, and he had a very distressed expression of countenance. He complained of severe and constant pain in the lumbar region, radiating down over the gluteal regions; it was worse at night, and he got very little rest. Sometimes the agony was so great that he screamed out loudly.

He could not stand for more than a minute or two at a time, and then bent forward. He was incapable of dressing or undressing without help.

When he was lying on the operation table, face downward, the upper part of the lumbar region, at the first and second vertebræ, had not the normal curve, but was slightly bent backward. Opposite here the pain was most intense to friction or pressure. In this locality, also, the patient said he felt the pain greatest without being touched. He was extremely sensitive on the sides on the way down to the base of the spine. The great sciatic nerves responded painfully to friction.

Progress.—February 10th. I treated him at once. As the illness had lasted so long, I kept on for twenty-five to thirty minutes. The pain was then considerably diminished. The reaction ensued, and he became very weak, as if tired out, and he could not stand. He had to be carried down.

February 11th. During the previous day the patient had felt a great deal better, and had enjoyed more rest than for several months back, his sleep being less disturbed and the pain much easier. When it set in during the night, he tried himself to imitate my manipulation, and obtained relief by it. When he left the room, the other doctors present called my attention to his conspicuously free walk.

February 12th. He had slept through the whole night. The radiating pain over the gluteal region had gone, and only the original places in the lumbar region were painful. The patient looked brighter, and laid himself down on the operating table without any difficulty.

February 13th. Slept well; pain absent except on moving. During the night he felt only a kind of tenderness in the back.

February 16th. Slept well; entirely free from pain during the night. He has a keen appetite, which he has not had for many months.

February 18th. Feels pain only on quick movements. Began free active movements. Peculiarity in back gone.

February 26th. Has dressed unaided. Can, with arms extended upward, bend sideways and forward without any assistance. The pain produced by pressure or frictions greatly diminished. He can walk about for a considerable time without getting worse.

March 5th. Has for several days been free from pain after walking; he is about nearly the whole day; makes the active movements better and better each morning.

March 9th. He was so much improved that he could be sent from the hospital, but was to continue the treatment for some days yet. The active movements go very well. Bending forward he can touch the floor with his hands. In the morning these movements hurt him slightly at the beginning, but in the afternoon he feels nothing.

March 16th. Treatment stopped. He has to continue the active movements at home. After a week he resumed work at the arsenal.

Treatment.—In rheumatic and traumatic lumbago I always confine my treatment to the places which I find to be most painful to frictions. So I did in these two cases.

I placed my hands as shown in Fig. 73, the first phalanx of the thumb on one side of the spine, and those of the fore and long fingers on the other, over those situations which gave most pain. (It should be noted that the actual tips of the fingers are not applied.) Then I gave light vibrations and

Fig. 73.

frictions alternately, and following these in both cases free active movements, consisting simply in bending, and turning in different directions, due attention being paid to correct positions.

At first, when these active exercises are made, I always give pétrissage at the seat of the pain, while the patient is moving. This eases it, and the movement goes better.

In the second case the patient was treated once in the

morning for twenty minutes, with the exception of the first day. After he had begun the active exercises, he repeated them once every afternoon.

XIII. Stiff Neck.

H. E., working man at the Naval Arsenal, 48 years of age, entered the Marine Hospital, Pola, on the 15th November, 1888.

Three months previously he had had a fever, after which stiffness of the neck and severe headache remained, the latter in the occipital region. The stiffness and the headache gradually increased. The headache was somewhat eased by the patient lying down on his back. At the infirmary he was treated with antipyrine and salicylate of soda. Of the first he had altogether taken about 9 grammes, of the latter 40 grammes.

On the 10th of December, 1888, he came under my care. His head was then immovable in all directions; the occipital headache was very marked; the cervical muscles were tender down to the shoulders. Sometimes the pain even passed down the arms. The slightest friction over the great occipital nerves gave intense pain.

Progress.—On the above date I started the treatment. The patient could move his head pretty well sideways and forward and backward after the first sitting.

December 11th. The improvement of the day before continued. After the treatment the pain was greatly diminished, and the movements were freer.

December 14th. Treatment and the movements, which are now normal in all directions, are painless. No headache.

December 15th. No treatment.

December 16th. Complained of noise in the ears and pain in front of them, tenderness of the sterno-mastoid, and tenderness and crackling in the temporo-maxillary joint.

December 17th. Noise in the ear lessened, as also the pain in the sterno-mastoid muscle, the pain in front of the ear, and crackling in the joint.

December 18th. Noise in the ear nearly gone. No pain anywhere.

December 19th. Discharged as cured.

Treatment.—The greatest pain was found at the places of attachment of the muscles of the neck to the occipital bone. There, then, I principally applied the treatment, which consisted in pétrissage. The muscles themselves I treated only very slightly.

On the pétrissage followed passive and active movements, as in Figs 47, 48, 62.

Here it was seen that a muscle acting under resistance contracts more forcibly—*i.e.*, the range of movement is greater—than when it does so unimpeded.

Lastly, I made light vibrations over the occipital nerves.

The noise in the ears, the pain in front of them, and the crackling in the joint, were treated with pétrissage and frictions over the facial and anterior auricular nerves.

XIV. Tendo-vaginitis.

K. K., sailor, 22 years old, came under treatment on the 12th of December, 1888. Six days previously inflammation had set in in the tendons of the extensores primi internodii and

Fig. 74.

ossis metacarpi pollicis. It began spontaneously. The tendons were thickened for about 5 cm. in length, where they lie in their sheath of the annular ligament; strong friction sounds on movement; pain on touch and movement.

December 14th. Friction sounds still present, but only in

the neighborhood of the joint, absent higher up; pain is only felt in the morning.

December 17th. Friction sounds can nowhere be heard. Movement also in the morning completely painless.

December 18th. Dismissed cured.

Treatment.—I gave at first pétrissage; afterward passive movements, with strong extension of the affected tendons; these were followed by active movements under resistance for the affected muscles.

While I gave the pétrissage I bent the patient's hand strongly toward the ulnar side in order to keep the tendons extended, and thus prevent them from moving (Fig. 74).

The patient was treated every day from eight to ten minutes.

XV. Wound of the Cornea.

Miss M., dressmaker, Clapham, injured her eye on the 12th of December, 1887. She was shaking a towel when with one of the corners she struck her right eye sharply. Pain set in, and grew worse during the night. It was so severe as to prevent her from sleeping.

On the morning of the 13th she went to a doctor, who told her there was a cut "over the dark part of the eye." He put two drops of "something" into the eye, and gave her a lotion to bathe it with. I called in the evening to treat the lady of the house where she was working. As the pain had steadily increased during the day, I was asked to look at her eye, and if possible relieve her.

When I saw her about 9:30 P.M., the eyelids were swollen and red, the conjunctiva injected, the vessels in the sclerotic part of it enlarged and shooting toward the cornea. On examining the cornea, I found a wound close over the horizontal diameter, and a little to the outer side of the pupil. The wound did not now present the appearance of a cut, but had spread on all sides, and was somewhat larger than an ordinary pin's head. The edges were irregular and seemed turned up. There was a slight discharge of pus, much lachrymation and photophobia; the pupil was very dilated and fixed; it was not round but uneven. All the branches of the fifth nerve responded very painfully to friction.

Progress and Treatment.—I gave vibrations on the eye,

and frictions over the branches of the fifth nerve. I had to pursue the treatment for about twenty to twenty-five minutes before the pain entirely disappeared. As the lotion had done no good, I told her to discontinue it, to keep the eye covered, and to abstain from work.

December 14th. The pain came back later on, during the night, but only very slightly. She slept fairly well. The swelling and redness of the eyelids were greatly reduced; the injection of the conjunctiva, both on lids and eye, was also considerably diminished. The pupil reacts only slightly and sluggishly. On looking at a strong gaslight only little pain is felt.

December 15th. Pain in the eye completely gone. None during the night. Upper lid nearly normal; injection of eye less than on preceding day; pupil reacts better; wound in cornea healed up.

December 16th. No lachrymation; eye clear; can read ordinary newspaper print.

After a week's treatment she was able to do needle-work without difficulty or pain.

Treatment during all days, excepting the first, lasted ten minutes in the forenoon, five minutes in the evening. On the 15th I also gave nerve vibrations on the eye itself (Fig. 40). The treatment was continued for some days longer, and was given only in the evening for a few minutes.

XVI. Scar on Palmar Surface of Right Hand.

Lieutenant P., of the Fort Artillery Battalion at Pola, consulted me on the 14th December, 1888. Four weeks previously he had cut his hand through falling with a spirit-lamp. The scar began about 1 cm. below the right wrist, and passed in half-moon shape over the anti-thenar until near the ulnar edge of the hand. It was about 6 cm. long, immovable, retracted, edges hardened and elevated. When the ring finger was stretched it was considerably drawn in at the wrist. The hand and the forearm were weak, so that the patient could not use them. The feeling in the little finger and ulnar side of ring finger was much diminished; friction over the ulnar nerve causing no reaction in these places. Adduction of the little finger not possible.

The first treatment was given on the 14th December, and after it the feeling in the little finger began to return.

December 15th. More power in the hand.

December 16th. Scar not retracted so much; edges softer.

December 17th. If the hand is placed flat on the table, the patient can adduct the little finger. Scar less depressed, and the drawing in at the wrist, on stretching the ring finger, is hardly perceptible. Scar in the hand freely movable.

December 18th. At the wrist it is free from parts under-

Fig. 75.

neath for about ¾ cm. The feeling in the ring and little fingers greatly improved. Power in the arm and hand normal.

Treatment.—I gave pétrissage over the elevated and hardened surroundings of the scar. In order to detach it from the parts underneath, the two thumbs were placed opposite each other, with the volar surface of the ungual phalanx on the scar, at a distance of about 1 cm., and in the direction of it. The thumbs were then moved toward each other (Fig. 75). Of course care was taken that the parts of the scar underneath the thumbs moved with them. In this way the adhesions were mechanically torn down.

The weakness in the little finger was caused partly by direct injury of the muscles, and partly by impaired power of the ulnar nerve. That the nerve was actually affected was

manifest from the direction of the scar, and from the fact that it did not respond to frictions over its course.

The weakness of the muscles was treated with pétrissage and active movements under resistance. For the diminution of feeling I gave frictions over the ulnar nerve.

XVII. Severe Bruise of the Face and Concussion of the Brain, in Consequence of a Fall from a Dog-cart.

Mrs. A. A. C., about 50 years of age, residing at Kensington, London, met with an accident on the 7th August, 1888. The dog-cart in which she was driving came in collision with a heavily-laden van, and she was thrown out. She fell on her face, was stunned by the blow, and taken to St. Thomas's Hospital, where restorative measures were applied. Gradually she regained consciousness, and her daughter, who accompanied her, then brought her to me. She felt very giddy while driving over. She had fallen on the left side of the face. The chin received the hardest blow, and was very badly bruised and open. The lower lip was cut through by the teeth in two places. The greatest swellings were over the two named places, and over the malar bone. The nose was swollen, but not broken. The right maxillary joint was very tender, and she could only open the mouth very little. Considerable pain was present in this region. The head ached.

Progress and Treatment.—The pain was taken away and the swelling greatly diminished by vibrations and light kneadings. The wounds through the lip were brought together with silk plaster, as she would not allow me to stitch them up; that on the chin was left open. I also gave nerve frictions in the neck for the headache. The patient felt well enough on leaving.

August 8th. When she called at my house the following morning, there was no dark discoloration anywhere, except on the lower lid of the eye. The lower jaw was more movable. She had slept pretty well, but was now and then awakened if she turned over to the side on which the injuries were. All the sensory branches on the skull and forehead were exceedingly sensitive.

I went to her house in the evening and treated her again. Treatment same as yesterday. In the afternoon a feeling of

sickness with giddiness and severe headache set in, and increased until seven o'clock, when I paid my visit. She could not bear any light in the room; would on no account open her eyes. The pulse was seventy beats a minute, lightly irregular. The seat of the pain she said was deep in the middle of the head. She was somewhat drowsy. I made frictions over the second pair of cervical nerves and light vibrations on the eyes (Fig. 32)—in all for about twenty minutes. The headache was relieved by this, and she could open the eyes, the gaslight causing her no inconvenience.

The feeling of sickness remained, and for it I gave general pétrissage of the abdomen, accompanied by light vibrations in the pit of the stomach. The sickness then passed away. She fell asleep during the latter part of the treatment, but awoke in an hour with the same sensation of nausea, which was again taken away, and she again slept. This happened three times successively up till midnight, when I went away. I remained so long because it was the first case of that kind I had subjected to this treatment.

August 9th. After I left last night the patient had slept off and on until the morning. The headache was gone and also the sickness, but she said she did not feel quite clear in her head. There was some yellowness about the bruised places, all of which healed very well. The scab over the bruise on the chin peeled off. The branches of the fifth nerve on the forehead were still very tender. Frictions over them caused a slight feeling of sickness.

Treated once in the forenoon.

August 10th. Yesterday afternoon the sickness returned, but only in a very modified form, and she had also a slight headache; both soon passed away. Slept very well during the night. No feeling of sickness or headache this morning. Head clear. All bruises and cuts healed up.

August 11th. The patient felt very well. I stopped the treatment, but told her to let me know at once if sickness or headache reappeared. They did not.

XVIII. Ulcerated External Hemorrhoids.

Mr. C. S., 42 years of age, civil engineer, London. The patient has a nervous temperament. He leads a generous life, and is very plethoric. Digestion disordered for several months

back; has for a long time had a nervous cough, probably reflex from the stomach. At the beginning of January, 1888, he went down to Brighton for change of air, as he felt considerably out of sorts. While there, he read of the wonderful properties of certain pills, and their purifying effect on the blood. He at once proceeded to try them, and in rather large doses. The consequence was a violent diarrhœa, followed by an equally obstinate constipation, with the diagreeable sequel of external piles. He now went from Brighton to Hastings, where he became worse, and had to lie in bed. The piles gradually began to inflame and ulcerate. At last, Mr. S. was advised to return to London, in order to undergo an operation. The idea of this rather terrified him, and he came first to me on the 21st of February, 1888.

There were no less than seven ulcers clustering all round the anus, and the surrounding redness, which was very intense, extended high up on the gluteal regions. Several of the ulcers were three-quarters of an inch long and a quarter of an inch broad. The edges were elevated.

I wished to make complete internal examination, but the patient would not allow it, because of the pain it caused him at Hastings. He suffered greatly on walking. The stools gave him much pain, and this remained for a considerable time afterward.

Progress.—I treated him at once for rather more than half an hour, when I succeeded in relieving the pain and irritation. In the evening I occupied the same length of time.

February 22d. He felt considerably easier, and the redness on the gluteal regions had disappeared.

February 24th. He had improved from day to day, and could now walk about comfortably.

February 26th. The ulcers had entirely lost their inflammatory appearance, had sunken, and were diminished; the stools gave no pain.

February 27th. The patient started on a six weeks' travelling tour on the Continent, the ulcers soon healed, and he had no discomfort whatever.

Treatment.—I first washed the ulcers with a solution of corrosive sublimate (1: 2,000). Then I placed a moist piece of lint over the particular ulcers to be treated. Over this again I laid gutta-percha, in order to prevent the heat of my hands

being transmitted to the inflamed piles when I made the vibrations. I subjected one side at a time to manipulation. I treated the patient twice a day up to the 24th, the duration of the treatment decreasing with each sitting. I also gave frictions over the sensory nerves on the sacrum, and over those on the gluteal region. After that I made shakings and tapotement of the liver; nerve frictions in the back opposite the lower angle of the scapula on the right side; and lastly, general pétrissage of the abdomen. I supplied the patient with some corrosive sublimate solution and lint for the journey, in order to keep the ulcers clean.

XIX. Stiff Knee Forcibly Broken Down.

The following case dates as far back as the summer of 1884, when I was in charge of my brother's institution in London. Dr. Thomas Easton, of Stranraer, was also there studying the treatment. He has been kind enough to send me the notes which he took of the case at the time. They are as follows:

Paul W., Holly Bank, Sheffield, engineer, suffered from rheumatism for many years. It was first contracted at a colliery work, where he was often exposed to damp and cold. At first the rheumatism was mostly confined to his right shoulder. In February, 1883, he felt the pain in his right knee, but after applying cold water to it for a day or two it disappeared. He had then a period of six months during which his health was very good. In November of the same year the rheumatism returned, and his right shoulder was severely affected. At this time he had a fall, bruising the right knee. The rheumatism spread more over the body, attacking the left hand, and finally seemed to settle permanently in the right knee. The patient was then confined to bed for ten weeks, during which his knee was kept at rest.

Hot fomentations and blistering were tried, and subsequently mercurial ointment, but the result of the illness was a stiff knee. A month or two later, the patient put himself under the care of Mr. Kellgren, of Eaton Square. He remained one month under his treatment, but only made slight progress. Mr. Wood then went to Cardiff, and his medical advisers there partially broke down his knee in two separate

operations under chloroform and ether. After the operations the knee was put up in a bent splint.

In the autumn of 1884 the patient returned to Eaton Square, and, in the absence of Mr. Kellgren, the treatment which he had before received was recommenced by Mr. Arvid Kellgren. He made but slow progress, and suffered great pain. It was then suggested to him that the knee might be more forcibly broken down under chloroform. I accordingly put him deeply under chloroform, while Mr. Arvid Kellgren broke down the adhesions round the knee. The operation was performed twice, at an interval of a fortnight. The first breaking down was only partial, but on the second occasion, on the 10th of September, the knee adhesions were completely broken down, the leg being flexed on the thigh as much as it can be under normal conditions. The pain after the operation was very severe, and the swelling around the joint considerable, but after pétrissage and effleurage had been applied, the pain almost disappeared.

Thursday, September 11th. The patient passed a tolerably good night, though he was rather feverish. The pain only gave slight discomfort. Spasmodic jerks were felt during the night at the knee-joint.

On examination, the joint was found to be more swollen than on the previous evening, and there was slight discoloration in front, just below the patella. The joint was then moved, active and passive movements being tried. After the movements pétrissage was given. Pulse, 82; temperature, 99°. The patient expressed himself much relieved after treatment.

Friday, September 12th. The patient felt feverish. Temperature, 99.5°; pulse, 84. The tension in the knee was greater, and the area of discoloration had extended much further in front. Movements and massage were again applied. The same evening his temperature rose to 100°, but after the treatment it fell to 99°.

Saturday, September 14th. Temperature, 99.2°; fell to 98.8° after treatment; pulse, 78. Swelling still great. The discoloration more diffused; pain less, but jerking spasms.

The same evening the temperature was 99.6°, and pulse 82. After treatment these were respectively reduced to 98.8° and 78. The swelling was still great, but the extravasation color was changed, and movement in the joint through a small limit was easier and without pain.

Monday, September 16th. Temperature, 99.2°; pulse, 84. Swelling still considerable, and jerking pains annoying on going off to sleep.

During the following days the pain on moving subsided in a marked degree, and the discoloration and the swelling rapidly disappeared. On Sunday, the 15th, the patient had gone down-stairs, and after a fortnight he came to Eaton Square. On the 20th of October he left London, although we told him that a longer stay was necessary. On the 1st November he writes as follows: "I find I can walk fairly well, though the leg does not bend much past the right angle, nor will it go perfectly straight like the other."

As long as the patient stayed at home he was treated twice a day, half an hour on each occasion; afterward once a day.

XX. Infra-clavicular Dislocation of the Left Humerus.

Marcus F., 47 years old, workingman, came to the Marine Hospital at Pola on the 21st February, 1889, with the left shoulder dislocated. He said that a cart-load of sand had fallen upon him the day before. The pain in the left shoulder was so great that he turned quite faint, and could not rise without assistance. On examination of the shoulder, the head of the humerus was found lying under the clavicle. The swelling from exudation was considerable, and extended over the whole of the upper arm, on the inner side of which discoloration began to show itself.

On the 22d, in the morning, the patient was put under chloroform, and the humerus replaced by circumduction. The arm was afterward put in an ordinary sling.

February 23d. I began with passive movements—viz., pétrissage, effleurage, rolling (Fig. 50). Unnecessary movement at the shoulder during the pétrissage and effleurage was prevented by stretching and adducting the arm to the side with one hand, while I worked with the other.

February 24th. No treatment.

February 26th. The arm during the rolling could be carried as high up as the level of the shoulder. There was great discoloration on the inner side of the upper arm. On the previous day the patient tried to move the arm himself, and had got it partly dislocated again, the head of the humerus being

on the anterior and lower edge of the glenoid cavity. In order to prevent a recurrence of this, the arm was bandaged up over the chest. Began with active movements.

March 1st. He could stretch the arm horizontally forward, and if he steadied the hand against the wall of the room he could work it up until it reached nearly as high as the sound one. The rolling, extension, and flexion go much freer. When he half lies with the back steadied, I could without difficulty stretch his arm straight up. He could place his hand on his neck.

March 6th. The arm was left free, and he was told to move it about often during the day. He can reach as high up with the hand of the injured arm as with that of the sound one.

March 7th. The active movements under resistance show that the muscles round the affected shoulder have almost completely regained their strength. The topographical appearance of shoulder normal.

March 14th. Treated for the last time but allowed two days' rest from work.

The patient was treated once a day for about fifteen to twenty minutes, with the exception of the 24th and 25th February, and 3d and 10th of March, when no treatment was given.

XXI. Fracture of the Lower End of the Radius.

A. R., sailor, 20 years old, working in the engine-room. On the 10th of December, 1888, he fell on the dorsally flexed left hand. Severe pain, extravasation, and swelling ensued. There was an oblique fracture of the lower end of the radius, starting at the ulnar side below, and going outward and upward. He had his arm in splints, which by my direction were removed, and they were not replaced so long as he remained under my care.

Progress and Treatment.—December 12th. I began the treatment, which consisted in pétrissage, effleurage, and other passive movements, rolling, etc. The patient felt considerably easier after the treatment, the pain at the fracture and joint being diminished.

December 15th. Swelling nearly gone. During the passive movements he feels some pain at the seat of fracture.

December 16th. He yet feels pain at the seat of the fracture from the passive movement. He can extend and flex the hand at the wrist nearly normally, and without any pain. As yet he cannot lift anything. The exudation has disappeared to such an extent that the flexor tendons are clearly seen. Active movements under light resistance have been started.

December 17th. During the night he had slept on the arm without any bad consequences. The active movements go better, yet he cannot lift anything; can close the hand completely and rather firmly. Free supination and pronation possible, but he feels pain at the seat of the fracture on resistance being made. The passive movements—such as rolling, flexion, and extension, etc.—are painless.

December 18th. Active flexion and extension movements can be made without the arm being steadied at the seat of the fracture.

December 21st. Stopped the treatment, as I left Pola. No movements gave pain—all were normal, and the patient could lift light articles, such as books, etc. The treatment lasted each day for about a quarter of an hour. When I gave pétrissage and effleurage, I steadied the whole arm on the table, and with the left hand I fixed the fractured place. During the other passive and active movements I grasped with one hand the fracture, so that thereby the pieces were kept from moving. As there was no one in Pola to continue this special form of treatment, the splints when I left were replaced.

XXII. Stiffness of Elbow-joint after Fracture at the Upper End of the Radius.

H. J., Lieutenant in the I. and R. Austrian Navy, came into the hospital at Pola on the 27th of January, 1889, having fallen on his right elbow from a bicycle. Great pain, immobility, and swelling were present at that joint.

January 28th. The contusion was strongly colored; abnormal movement and crepitation were felt about two fingers' breadth from the head of the radius. Plaster-of-Paris bandage was applied on the arm, which was held at a right angle and midway between supination and pronation.

February 18th. The plaster-of-Paris bandage was removed, and I was asked to correct the abnormal position.

There was very little mobility at the elbow. The amount of extension and flexion was about 20° in each direction, with the right angle taken as starting-point. Supination and pronation absent. The wrist-joint was stiff, and did not allow of much movement. It was also very weak.

He could only with the tip of his thumb touch the protruded chin, or the forehead when the head was bent forward. Could with difficulty pass the hand behind his back, and he was unable to move it higher than the lumbar region.

When the arm was passively extended, the tendon of the biceps muscle was felt to be very tense.

Swelling was still present, especially over the outer side of the elbow, and extended for some inches up and down, obscuring the contours. It pitted deeply on pressure, and remained so for some time.

Pain was felt on pressure over the swelling at the seat of fracture; at the elbow and wrist-joints on moving; and in the ulnar nerve, where it passes behind the internal condyle of the humerus, because round it exudation had settled and filled up the groove.

Treatment and Progress.—I took the case in hand on the 18th of February. The treatment consisted in pétrissage, effleurage, and other passive and active movements, some with, some without, resistance. I gave them all from the very first day. During the treatment, crackings were often heard from the tearing of organized exudations.

March 9th. The arm had regained its strength; the bending and stretching had so much improved that the angle formed during movement was 160°. Supination and pronation were already normal on the 6th; the patient could go through the fencing movements with the sword very well. No pain in the ulnar nerve on strong flexion; no movements caused pain, they were all performed with freedom and ease.

March 16th. The bending at the elbow was nearly normal; same with the stretching. Passing his hand behind his neck, the patient could touch between the shoulders with the fingers; and passing it behind the back, he could reach the shoulder of the same side (*i.e.*, the right one).

The patient had already, on the 9th, left the hospital to resume his naval duties. After the 16th he remained away for several days, and came afterward a few times for treatment.

The treatment lasted every day for about twenty minutes, and it continued a longer time than usual because of the short-

Fig. 76.

ening of the biceps muscles, and the pain in the ulnar nerve caused by the exudation round it.

Fig. 77.

I should wish to draw attention to the following points in the accompanying illustrations of movements given during the treatment of the above case. In Fig. 76, showing pétrissage

at the elbow over exudation there, it should be noticed how completely the position of the left hand steadies the arm.

I have treated fresh fractures round the elbow at once with pétrissage without causing the patient much pain, because steadiness of the arm was thus secured.

In Fig. 77 note the application of the hands for pronation and supination of the forearm. The one grasps the elbow, the other the hand, with two fingers passed down in front of the wrist.

In Fig. 78 we have the application of the hands for gradually breaking down a stiff wrist. Both hands are placed

Fig. 78.

close to the joint. Passive extension and vibrations are made as we move it.

XXIII. Double Fracture of Fibula at its Lower Third, with Fracture of the External Malleolus.

W. R., 24 years old, Lieutenant in the 97th Austrian Infantry Regiment, was carried to the Marine Hospital on the 1st of February, 1889. He had been riding on horseback. The horse fell, and he had his right foot under it. The foot was strongly inverted just after the accident. The patient complained of fearful pain, especially at the internal malleolus. The parts round the ankle were greatly swollen. Examina-

tion showed fracture of the fibula at its lower third, where crepitation was felt. The internal malleolus was also believed to be broken, but owing to the pain and excessive swelling it could not with certainty be decided to what extent. The leg was put in a Petit-boot. The pain grew so unendurable during the night that the patient had to send for the resident surgeon, who ordered an ice compress. On the 4th, several bullæ, each the size of a sixpence or more, made their appearance on the inner and lower part of leg and ankle. They contained serum; were opened and treated with iodoform bandage.

On the 12th of February I saw the patient for the first time. The foot and leg were immensely swollen, the swelling extending as high as the knee-joint. The exudation was rather firm, pitted everywhere deeply on pressure, and the pits remained long.

The skin had a greenish-yellow color. There were three especially painful places, and after the treatment had been given for some time the fractures could very well be made out. One was transverse 10 cm. high; another oblique, running from below upward and backward, and ending posteriorly about 3 cm. above the tip of the external malleolus. Both were on the fibula. On the internal malleolus there could be felt a longitudinal furrow, starting at the tip and going upward for a distance of 2 cm., and then bifurcating forward and backward, ending 4 cm. high anteriorly and 3 cm. posteriorly. It was thus easily to be seen that the injury had been caused by a crush. The bullæ were not completely healed. The foot was stiff.

Treatment and Progress.—It consisted as usual of pétrissage and effleurage; intermingled with and following on the former being other passive movements, such as rolling, extension, and flexion, etc.; then active movements, partly free, partly under resistance; and lastly, frictions over the internal and external popliteal nerves.

February 19th. The swelling has gone down on the leg, but remains round the ankle and upper part of the dorsum of the foot, although considerably diminished. The movements at the ankle go pretty well, and do not cause nearly so much pain as at first. The fractured pieces adhere well to each other. The bullæ have healed. They had delayed the treatment on the inner side of the ankle.

February 26th. The swelling round the ankle much diminished, and on the dorsum of the foot it is gone. The passive and active movements are scarcely felt at the fractures. The patient can move his feet freely. I decided to let him try to walk, which he did, steadied on both sides. He kept the foot stiff, both because he was somewhat nervous and because he felt pain in the joint when he rested his weight upon it. It was, he said, a sort of burning sensation. As I supposed that the pain was caused by exudation in the joint itself, I gave rolling of the foot, and passive extension and flexion, rather longer than usual. At the fractures he felt no movement on walking. The muscles of the calf are smaller on the injured leg, and do not act so well.

March 6th. Walked up and down the room for over five minutes. The foot turned very red, but there was no pain in the joint. He walks pretty quickly and steadily without assistance. He feels the foot somewhat stiff, from a dragging behind at the heel and internal malleolus. From to-day, the foot and leg lie free.

March 12th. He has walked more and more every day, and each time with greater ease. In order to diminish the stiffness and to stimulate the muscles of the calf, he had to make the movement shown in Fig. 58. When doing so for the first time, he slipped and twisted the foot again. This gave him pain at the seat of the fractures, but it speedily passed away on application of vibrations.

March 13th. During the night he had felt pain in all the fractured places, but it was very slight. Treated as usual and made to walk as before.

March 14th. Free from pain yesterday and last night. The swelling, which is very stubborn on the inner side of the ankle and round the Achilles tendon, has greatly subsided. The movements in the foot are normal, except dorsi-flexion, which is somewhat prevented by the Achilles tendon and by the tendons passing round the thickened internal malleolus. The muscular power developed is good. Is allowed to dress and go about the room; must, however, when sitting keep the leg in the horizontal position.

March 19th. Walked out yesterday morning for the first time. Had to go up and down two flights of stairs. Going down-stairs was somewhat difficult, but up-stairs not. Went

out again in the afternoon and walked about for an hour in the hospital garden. The patient was not allowed to use his own boots, but used a pair of large ones.

March 23d. Walked into town yesterday with his ordinary boots on. Felt nothing beyond a little stiffness in the ankle. He was on his feet for over three hours. Walks with a full step.

March 30th. Goes on leave next Monday, the 1st of April. Treated to-day for the last time.

The malleoli are thickend from the exudations at the seats of the fractures. They have the following measurements in

Fig. 79.

comparison to the sound ones: Internal malleolus on broken side, 4¼ cm. broad; on sound side, 3½ cm. External malleolus, 3½ cm. on broken side; 3 cm. on sound side.

The case ought to have been under manual treatment from the very first day. The exudation would then never have been allowed to settle as it did, and the recovery would consequently have been very much quicker.

The illustration (Fig. 79) shows how the thumb is applied alongside the fibula in order to act as a splint while we extend and flex the foot.

I met the patient on my way to Vienna at the end of April. He then walked well, and it was only when he walked very quickly that one could see that his foot had been injured.

The patient had no treatment on the following dates: February 17th, 24th, and 25th, March 3d, 10th, 17th, 24th, 25th, 26th, and 27th.

Bearing in mind the structure of the foot, it will readily be seen that it is possible to evert and invert it without danger provided we take the precaution of placing the hand over the point of fracture, and the foot be held at a right angle to the leg. These movements do not, as we know, take place at the ankle-joint, but chiefly at the astragalus, scaphoid, and calcaneo-cuboid articulations.

XXIV. Double Fracture of the Fibula at its Lower Third.

On the 15th of January, 1887, Mrs. L., 43 years old, slipped and fell as she was stepping out of her carriage. She rose up and fell again. On both occasions she heard a distinct cracking in her left ankle. The second time of falling she fainted away.

On examination it was found that the fibula had sustained two fractures: one oblique, running from below forward and outward, about 10 cm. from the tip of the external malleolus; the other transverse about 3 cm. from the tip of the same malleolus. At the upper seat of injury the pieces of bone were somewhat displaced, and here the effusion appeared first; at the lower there was no displacement, but the fracture was felt very well when the foot was inverted.

Progress.—January 15th. Between the first two applications of the treatment on the day of the accident, the swelling did not increase very much, and the patient had no pain.

January 16th. During the preceding night, a considerable amount of effusion had collected round the ankle, over the dorsum of the foot, and upward as high as the upper third of the calf. It was not very tense, and pitted easily on pressure, but the depressions quickly disappeared. There was no discoloration. The patient had slept well and had had a painless night.

January 23d. The effusion has passed almost entirely away, remaining only over the fractures and on the inner side of the ankle; but the cause of its appearance in the latter place was, I believe, gout, which was present as a complication.

Over the whole of the leg in general no discoloration had been present, except a slight yellowish tinge; but high up on the posterior surface of the calf I noticed on the morning of the 17th a dark blue color, which indicated to me that I had not carried the treatment sufficiently far.

There has been no pain. The sleep had been undisturbed. The patient can extend and bend the foot to a considerable degree without much difficulty. Eversion and inversion slight. When the same active movements are made under resistance they go better.

January 30th. The effusion is gone, but it still remains over the fractures and inner side of ankle, although in a much smaller amount. All the movements can be performed easier and with more force.

February 6th. Scarcely any effusion over the fracture. On the inner side of the ankle it comes and goes, owing to the gouty condition. The patient has during the week walked about the room unassisted, simply steadying herself by the furniture. No movement perceptible at the seat of the fractures. Active movements performed with considerable force. Both they and the passive are nearly normal in range.

February 20th. The patient can walk quickly up and down stairs. The movements at ankle-joint normal in range and power. No abnormal thickening at the seats of the fractures.

Treatment.—No splints were applied. The deviation of the foot was corrected simply by muscular action. When the patient was sitting or lying, the foot was steadied at a right angle to the leg.

Pétrissage and effleurage were given from the very first, and also vibrations over the situation of the fractures. The former were administered for the effusion; the latter more especially for the pain. During the first days other passive movements, such as rolling, bending, stretching, eversion and inversion of the foot, were given in order to prevent exudation from organizing and causing stiffness. Active movements as in previous case.

The patient was not kept in bed a single day. She was helped down-stairs every morning, and had then to use the foot as little as she could at first, but it was always held at a right angle to the leg. From the third day, the patient was

allowed to drive out, the same precaution being taken about the foot as when she was sitting in her room.

During the first weeks the treatment was given twice a day.

XXV. Cystitis.

Mr. L. R., 30 years of age, had for several months been troubled with a slight gleet. In order to get rid of it quickly, he had recourse to a 1-per-cent injection of nitrate of silver, which he had heard would produce an immediate cure. He used the injection so carelessly that a part of it passed into the bladder. This caused him extreme discomfort; so much so, that he was compelled to remain completely quiet for over an hour after its application.

It was a very warm summer day, and the patient in the afternoon took some ices. He very soon began to shiver, went home, and repaired to bed, where he was obliged to remain three days. Fever, vomiting, intense irritation of the bladder, pain in the perineum and lower part of the back and sacrum, set in. His appetite entirely left him, and he could only drink acidulated water, and take fluid food; there were constant calls to empty the bladder, which were accompanied and followed by intense irritation and a desire to void the urine though the bladder was empty. He had very little sleep at night.

On the fourth day, September 3d, 1888, when he came for treament, the above symptoms had slightly subsided. He looked worn and haggard, suffered from a feeling of great prostration, and bitterly repented having tried to work his own cure. He had no fever; the appetite had so far improved that he could take very light food. Walking was exceedingly disagreeable to him, as also driving, because both set up irritation in the bladder.

The urine deposited pus, mucus, triple phosphates of ammonia and magnesia.

Progress.—September 10th. The patient has been treated twice a day from the 3d. The very first treatment on that day gave him relief for some hours. He felt no discomfort on walking home. He passed a much better night, more rest and sleep being enjoyed. There has been a constant improvement from day to day. The urine is now passed two to three

times a day, and he does not need to rise during the night. For the last two or three days he has had no feeling of irritation after emptying the bladder, but only a kind of weakness. The deposition of phosphates, mucus, and pus greatly diminished. The appetite is improving.

September 24th. The patient has been treated once a day since the last report. He caught cold on the 14th, and had a slight relapse, which, however, soon passed over. For some days he has felt completely well. No abnormal deposits in the urine. Appetite good. Treatment stopped to-day. He decided to let time and light injections cure the gleet.

The patient has had no trouble from his bladder since the above date.

Treatment.—The special treatment consisted of tapotement over the lower lumbar, sacral, and perineal regions; light shakings of the bladder, both from above the pubic arch and the perineum; vibrations above the pubic arch; nerve frictions for several minutes over the lower lumbar and the sacral nerves; and, lastly, pétrissage of the abdomen. The nerve frictions were the most effective in reducing the irritation and inflammation. The patient drank a considerable amount of water, acidulated with the fresh juice of lemons.

XXVI. Migraine.

Mr. C. A., aged 27, had since August, 1888, suffered greatly from sudden onsets of violent headache. At first some time elapsed between each attack, but the intervals grew shorter until at length the patient had barely recovered from one attack before another began and in this manner more than a week would sometimes pass before he obtained complete relief.

The headaches are preceded by a heavy dull sensation in the head and shimmering (?) before the eyes in the morning when the patient awakes. The dull feeling passes away during the forenoon, but late in the afternoon pain suddenly sets in, and grows more and more severe toward night. The pain may reach its height at once, or its increase may be more gradual. It is throbbing in character, is felt most behind the eyes, and is generally equally acute on both sides. Light intensifies the pain. The patient dreads going to bed, because the recumbent position makes him worse. When he does lie

down, he after some hours goes off into a heavy sleep, and wakes up the following morning with a feeling of oppressive drowsiness, which on more than one occasion has lasted for several days.

These attacks leave him very nervous and exhausted.

The patient never feels sick.

He has found that the headache is brought on by fatigue, by sitting up at night, and by very strong light, as in theatres.

In the summer of 1888 he also became subject to attacks of palpitation. The first rendered him nearly insensible; he felt pain down his left arm, and had considerable difficulty in drawing his breath.

During the attacks of palpitation, the apex beat is seen and felt over a considerable area; the sounds are strong; the pulse is between 80 and 90 beats a minute, and full. The patient is very sensitive between the shoulders. The palpitation comes on at any time—sometimes it follows a meal, sometimes several hours afterward.

The patient smokes cigarettes.

The appetite and digestion are good.

Treatment and Progress.—On the 4th January, 1890, he was first subjected to treatment, which consisted of general movements, and, as special applications for the migraine, frictions over the nerves of the head and neck; for the palpitation, nerve frictions between the shoulders and vibrations over the apex of the heart.

At the end of January the attacks were less frequent, and very often, although the premonitory symptoms appeared in the morning, no headache followed, as treatment in the forenoon intervened. Palpitation has not occurred after the first week of treatment. During this month the patient has been treated regularly every day.

In the last week of February the treatment was discontinued, as there had been no headache for some time. When they had come on they disappeared after a short application of nerve frictions, alternating with pressure over the second cervical pairs. The treatment had not been given regularly during this month, often only two or three times a week. The general condition has greatly improved; no palpitation during the month.

XXVII. Acute Inflammatory Gastro-intestinal Catarrh in a Child.

H. S., aged 15 months, was during the night of the 10th July, 1889, suddenly seized with vomiting and diarrhœa. Up till then he had been perfectly well. The stools grew more frequent toward the morning, occurring every half-hour or twenty minutes.

I first saw the child at 8 A.M. on the morning of the 11th of July. The face had a pinched expression, the spaces round the eyes were dark and sunken, the fontanelles depressed. He was lying in a listless position, feebly whimpering every now and then. The pulse was very feeble, and went at the rate of 170 beats in the minute; the temperature was 102.2°. The motions were watery, intermingled with little lumps and some blood.

Treatment and Progress.—The local treatment consisted of vibrations over the abdomen for about twenty-five minutes, followed by slow and gentle pétrissage of the abdomen. Light frictions over the dorsal nerves and those of the neck, and some on the arms and legs, were also administered, partly with a view to reducing the temperature and partly for general stimulation.

When I returned in the afternoon at four o'clock, the temperature had gone down to 100.6°; he had had four calls to stool. The boy looked much better, he took notice of what passed around him, and chattered all the time I treated him.

At eleven o'clock in the evening I found my patient peacefully asleep, having been in this condition for two hours. He had been much better after I left in the afternoon.

July 12th, 4 P.M. The child had slept all through the night; had no fever, no diarrhœa. Treatment same as day before, and given for the last time. The boy was allowed to rise the following day. Light and cautious diet was prescribed. There has been no relapse.

In September, 1886, I had also a patient, a boy ten years old, suffering from the same complaint. He had turned ill in the evening very suddenly when going to bed. The vomiting in this case was very distressing, the stools were more watery, the pain in the abdomen was very considerable. I

treated him after the same manner as the above case. The sickness and diarrhœa ceased on the following morning.

XXVIII. Peritonitis.

A. S., aged 8, came under my care on July 13th, 1889. On the previous day he had complained of slight pain in the abdomen. The pain subsided toward the evening, but returned suddenly and with great violence on the following afternoon, accompanied by vomiting. I was at once sent for, but could not call before midnight. I then found the patient lying on his back with his knees drawn up, and the abdomen greatly distended. He complained of constant pain all over his abdomen, which was greatly increased by the slightest touch, movement of the body and legs, or by respiration. He was unable to draw his breath deeply; the respiration was short and thoracic. The pain was most intense in the epigastrium and round the umbilicus. There had been no action of the bowels. The temperature was 103°; pulse, 150.

Treatment and Progress.—After vibrations had been applied for about thirty minutes, the pain subsided to such an extent that the patient could stretch his legs out and could make deep respiration without much discomfort. I could now also make some pressure on the abdomen with the entire hand. Pointed touch with the fingers alone could not be endured. In addition to the vibrations, I gave frictions over the cervical nerves for several minutes, as well as over the dorsal sensory nerves.

July 14th. Forenoon. The boy had slept for about two hours after I left. He then woke up and became slightly delirious; the pain had also increased. Before leaving on my previous visit, I had shown the boy's mother what she had to do in case of a recurrence of the pain, and how she should apply the vibrations. She now made them at once, and the patient grew easier and slept again. Toward the morning he awoke once more, and for the second time she renewed the treatment, with good result. The temperature had fallen to 101°, the pulse to 120. The pain has considerably diminished, and the respiration is to a great extent abdominal. Treatment same as on my first visit. In the afternoon the tem perature had fallen to 99.8°. Treatment repeated as before.

July 15th. I saw the patient in the afternoon. The temperature was normal; pressure only produced slight pain. Very light pétrissage of the abdomen was given for the first time. The patient could take a little fluid food, such as milk and beef-tea.

July 16th. The bowels were moved last night. Did not complain of pain. Treatment same as yesterday.

July 18th. The boy was allowed to get up and to lie dressed on the top of the bed. Could scarcely stand from weakness. Has had some finely-divided meat and fish. Bowels have been moved once a day.

July 22d. The patient has been up and about during the last three days. Treatment discontinued.

The vibrations served the purpose of relieving the pain, preventing peristalsis, and reducing the inflammation.

I should like to add that I feel greatly indebted to the boy's mother for the rapid progress toward recovery in the last two cases. She had herself for several years been more or less under manual treatment. She is gifted with an unusually good hand, and could therefore correctly apply the vibrations.

ANTIPYRESIS.

BY

PROF. DR. ARNALDO CANTANI (NAPLES).

ANTIPYRESIS.

FEVER has ever been the chief object of medical observation and investigation. It has nearly always been considered the essential manifestation of disease, and many fevers are even considered to be the essence of these diseases. It is only recently that it has been generally recognized as a symptom in all cases. We therefore no longer speak of essential fevers.

It is indeed not easy to give a satisfactory definition of fever. In fact, I am free to confess that the theory which would base the entire febrile process on the working of certain nerve centres does not satisfy me, in spite of the experiments on animals on which it is founded and the influence of certain shot-wounds in the head. The so-frequently-observed post-mortem rise of temperature proves that we are concerned not only with the action of heat centres, but with local heat production in the tissues themselves as the result and effect of chemical processes of combustion; as after death not alone has every innervation ceased, but also the entire circulation, and the local increase of temperature can only find its cause in the local increased heat production.

The increase of temperature—in fact, the entire heat production—even in healthy individuals, is not entirely dependent upon certain heat centres. The heat production is manifested in the entire body, in all tissues, especially in the muscles, even if we admit that nervous influences from definite higher centres are capable of elevating the bodily temperature. But just as the piqûre (Bernard's diabetic puncture of the fourth ventricle) only produces a temporary glycosuria, and not a permanent diabetes, so the action of definite nervous centres can only bring about a transitory increase of temperature, but not a permanent or an intermittent fever.

Fever must be regarded as an acute alteration and acceleration of the organic metabolism with increase of the tissue

combustion, and thereby of the heat production and of the bodily waste.

In certain fevers more heat is also retained, but its increased formation, the greater consumption of oxygen, the heightened combustion, are at all events the chief factors of the febrile process. Even the higher regulation of the bodily heat is not intrusted to individual hypothetical nerve centres. It is probably regulated by the whole body, and especially by the entire nervous system, the vaso-motor nerves, and thereby the cutaneous arterial system, being included. But the body always offers an excess of fuel, and it is its quicker consumption and its increased combustion which is the essential source of the greater heat production in fever patients.

Clinically it is beyond doubt that all fevers do not call the fuel of the body into requisition in the same manner and in the same amount. It appears that in some fevers certain bodily tissues, in others, other parts are attacked, consumed, and used up, and this probably depends on the variety of the infecting microbes. Only in this way can we explain the fact that the results of the febrile process are so different in the various diseases. Thus in malarial fevers and also in acute articular rheumatism the red blood-cells are destroyed in large numbers; hence the convalescent patients remain markedly anæmic. So also the muscular system is especially attacked in typhoid fever, and secondarily at the same time the nervous system; hence the patient becomes exceedingly weak and emaciated, and the excretion of the waste products continues and may even be relatively higher in the first week of convalescence. The bodily weight suffers in a corresponding ratio. In tuberculosis all tissues and organs are generally attacked, the whole body wastes, even the heart becomes smaller and the vessels narrower; only the nervous system is often very well preserved, and in some cases of hectic fever seems to be unaffected; the patient frequently retains all his nervous activity, can continue his intellectual work, makes plans for the future, goes about to the very last, and often dies while on a journey. There are also fevers in which there is a greater bodily waste at a low temperature than there is in others at a higher fever. Finally, there are also fevers like that observed several years ago in Southern Italy, which run their course without any demonstrable lesion in any organ,

excepting a swelling of the spleen. With remissions and occasional intermissions, with moderate and at times with high fever, they run their course for weeks and even months without any corresponding effect on the general organism, as the bodily weight does not sink much more than would be expected with the more or less restricted diet. Thus we have a fever in which the organic albumin is for the most part spared, and only the circulating albumin is consumed.

Thus common to all fevers is this factor, that in them the bodily tissues are more or less attacked and used up, and as the indication to lessen the tissue waste is certainly very rational, so one of the most important duties of the physician seems to be the lessening and, if possible, the complete subjugation of the fever, the most important cause of the increased consumption.

We may attempt to attain this object in two different ways: by abstracting heat or by lessening the heat formation.

Abstracting heat does not mean combating the fever or lessening the bodily waste or saving the tissues; it resolves itself into a refreshing of the surface of the body, into an increased radiation of heat. Actually it is more or less a symptomatic resource which avails against the fever itself, but not against the increased combustion at the expense of the body.

Hence it was naturally supposed that everything was accomplished if one or several remedies could be discovered or devised which could annihilate the febrile process, lessen the increased heat production, and diminish the febrile tissue waste.

The indication was found in quinine, the antipyretic of many countries, the febrifuge par excellence. But the usual doses of quinine are not sufficient for all fevers; while they are ample for most varieties of malarial fever, yet they failed in the various other fevers, as for example in acute articular rheumatism, pneumonia, and typhoid fever. It was thus customary to give quite large doses of quinine, and as these could control the pernicious intermittent fevers, so it was thought that it would be possible to subdue the other obstinate varieties of fever. Hence large doses of quinine were used in all infectious and inflammatory diseases, and were even recommended in the septic fevers. But even if it was possible in this way to reduce the temperature of the patient before severe

cinchonism had been reached, yet it became evident that these large doses of quinine did not save the patient, and did not even exert a favorable influence on the course of the disease; in fact, that they only diminished the over-production of heat by lessening the vegetative activity of the organism.

So also digitalis, the remedy lessening the pulse frequency in cardiac patients, came into use and was favorably reported in fevers. The increased frequency of the pulse is indeed one of the most prominent fever symptoms, and if the doses suitable to cardiac patients do not suffice to accomplish this purpose in febrile conditions, yet with large doses it is possible not alone to lessen the frequency of the pulse, but also to lessen the fever. Yet in spite of this symptomatic success no good is done the patient, since these doses only lessen the combustion of the body by poisoning the organism to a greater or less degree and thereby depressing its vegetative activity.

Investigators succeeded in discovering better antipyretics, and in turn came salicylic acid, carbolic acid, kairine, thalline, antipyrine, phenacetine, and the like. With all these remedies we can diminish the fever and pulse frequency of the febrile patient—that is, we relieve the most important fever symptoms.

It is by no means easy to say how these antipyretics really act; in fact, it seems impossible to follow their action in detail. According to one, they lessen the heat production; according to another, they increase its radiation. Still others claim that they paralyze the fever ferments, and finally they are said to simply place the heat regulation on a lower plane. But such a paralyzing of the fever ferments can only be expected of remedies which have a specific action against the living disease germs, like quinine against malaria, carbolic acid against septic wounds, etc.; the other antipyretics are not also antiseptics. The degrading of the fever regulation in febrile patients is an ingenious conception, but evidently is only a simple hypothesis which cannot be verified. On the other hand, the increased radiation of heat is certainly produced by these agents, since the cutaneous vessels are dilated and a more or less profuse sweating may be produced. But besides the increased loss of heat by these remedies, there is also certainly a lessening of the heat production, which is un-

doubtedly the case where a somewhat larger dose is given (or even a normal dose is administered during spontaneous defervescence) and collapse results. It can also not be excluded from ordinary fever cases where the temperature has been depressed by antipyretics, because in order that an antipyretic should lower the heat production by lessening the vegetative activity, it is not necessary that a weakness of the pulse and a lowering of the arterial tension should occur.

The antipyretics, therefore, prevail over one of the chief febrile symptoms, the higher temperature, partly by increased radiation, partly by lessened heat-formation.

Such being their action, are they advantageous to the patient? Can or do they not directly injure him? These are the questions which must present themselves to-day to the intelligent physician, and they cannot be answered without at the same time considering other questions which relate to the fever itself. They are the following:

What really is fever in a disease and what relation does it bear to the same?

Does the fever constitute the real danger to the patient?

Can there exist remedies against the febrile process itself, when the diseases accompanied by fever and their etiology differ so among themselves?

And on what does it really depend that different remedies in different diseases subdue the fever almost with certainty, and at the same time determine the happy termination of the disease, while they are of little or no value in other varieties of fever; whereas other remedies, although they lessen the fever, yet exert no influence on the course of the disease and may even directly injure the patient?

To what should rational antipyresis restrict itself, to what limits may it be extended?

Fever is above all an accompaniment, indeed, a symptom, of so many and such various acute maladies, just as dyspnœa and cough are present in so many diseases of the respiratory tract, and dyspepsia and diarrhœa in such a variety of disturbances of the digestive apparatus.

Fever and inflammation bear the same relation to the diseased organism. They are the direct and immediate results of a disease. The body does not become diseased unless a material cause disturbs either its vitality as a whole or the

individual organs, tissues, or groups of cells. To-day we can also say that such disturbing influences—at least in general—are not found in a refreshing breeze, a cooling drink of cold water, or a rain-shower. All these chillings, which, as far as their influence on the general organism is concerned, are nothing as compared to a hot vapor bath with subsequent ice-cold douches, owe their importance chiefly to the fact that the organism during the stage of incubation of certain acute diseases has acquired such a thermal hyperæsthesia of the skin that the slightest draught, the least withdrawal of heat, even the cool bedclothes on retiring to bed, at once produce a chilliness in the body, and often even a true rigor, as a result of the contraction of the cutaneous arterioles which ushers in the febrile process, and the breaking out of the fully-incubated catarrh or rheumatism. How often has the same person been exposed to much severer chillings without any harm resulting, because at that time he was not predisposed to fever, *i.e.*, the disease-producing substances, the true causes of the catarrhs, pneumonia, pleurisy, nephritis, meningitis, were not in a stage of incubation. But at other times the resistance of the body, shattered by sheltering the living disease germs, needed only a slight insult, perchance an innocent breath of air, to permit the breaking out of the disease, and to announce this beginning with a chill to give a signal of reaction against the invading host.

Disease is for us the expression of the necessary combat of the organism against the cause of the disease, which is in most cases a pathogenic micro-organism, less frequently a chemical substance or a traumatism (the latter probably requiring the intervention of a chemical or a microbiotic influence).

Inflammation is the local reaction of the affected tissue against the cause of disease acting on that area; fever is the general reaction of the whole body to the changes caused in the general metabolism and the circulation by the pathogenic factor.

This reaction is the stipulation of recovery. Without reaction—*i.e.*, without inflammation or without fever—the body would be compelled to surrender without mercy to the hostile influence, as actually occurs in certain cases of very acute septic infection, or in hemorrhagic small-pox, and in other very

acute infections in which the too intense and too rapid blood-poisoning render all reaction impossible by paralyzing the vital forces, and directly lead to a fatal collapse. Without reaction on the part of the attacked organism against its antagonist, the living disease germs would produce such changes in the bodily tissues, would so alter the blood in its circulation, that the continuance of life, not to speak of recovery, would be impossible. The entire restorative power of nature, every spontaneous recovery, the resolution of pneumonia, typhoid fever, influenza, dengue—all these depend on this reaction of the entire organism against the invading micro-organisms. It is a struggle for existence between these two; and where the microbe is victorious, the patient's death-sentence has been determined; where the patient conquers the microbe, the parasite is rendered innocuous, at times overwhelmed and for the most part cast out.

Thus fever is only a sign of reaction, a measure on the one hand of the intensity of the infection, and, on the other, of the reactive power of the organism.

The infection may from the beginning find poor quarters as a result of the lessened predisposition of the organism, so also its intensity may soon be lessened; in both these cases the fever will remain low, because the infection is not intense and the organism does not need a stronger reaction. But the infection may also attack the organism so vigorously that its reactive power, too soon paralyzed, can no longer reply with a high fever, or even if it is powerfully reactive and does not respond with marked fever, yet does not succeed in overcoming the living germs and their baneful influence. In both of the latter cases the patient is lost.

But between these two extremes there are many others, and these constitute the great majority, in which the patient reacts with high fever and happily recovers.

The intelligent physician can usually infer from the whole symptomatology of the disease whether the moderate fever is the result of a slight infection, or if it is mild because the reactive power of the organism is paralyzed. In like manner he does not despair of a good result even with very high fever.

It is not the fever, or at least not the fever alone, which constitutes the severity or mildness of a disease. The patient with high fever with well-preserved muscular system, good

expression, normal color of the skin, regular and strong, although frequent pulse, is better off than another who, although the fever is lower, is disproportionally weak, with altered countenance, subicteric discoloration of the conjunctivæ, and weak pulse. In severe cases there is something present besides the fever which causes the gravity of the disease, which threatens to paralyze the vegetative activity of the tissues, which determines the patient's death-sentence in high as well as in mild or even normal temperatures. This above all is the nature of the cause of the fever, the quality and quantity of the invading parasites, and of the poisons which are produced or perhaps also excreted by them in the attacked body. Then there is, finally, the lessened or absent resistance of the organism.

By this we do not mean to say that a very high and especially a continuous fever does not have a serious prognosis. It is certainly the expression of the need of a strong reaction by the system, and is thus the index and measure of the severity of the infection against which the diseased organism must oppose all its forces to protect itself, to react energetically and, if possible, successfully. But, on the one hand, it is certainly not sure that this energetic reaction will suffice to overwhelm the infection, and, on the other, the long duration of the reaction and its coincident tissue waste may exceed the powers of resistance of the patient and may lead to the exhaustion of the reactive force.

The favorable influence of the febrile movement against the infection may be manifested in various ways. The fever may aid the patient: (1) By diminishing the vitality, the propagation, and possibly the virulence of the living germs in the body by the increased temperature of the blood and tissues. (This latter may suffice, as the direct extermination is unnecessary, in fact, is impossible for the majority of these microbes.) (2) By increasing the resistance of the tissues in their phagocytic capacity. (3) By sterilizing more or less the tissues and thus rendering them a less suitable nutritive medium as a result of the modification of the metabolism in fever.

Concerning the influence of febrile temperatures, we note that many pathogenic organisms—as, for example, the tubercle bacillus—bear such temperatures very well, and may even flourish luxuriantly; while other bacteria certainly suffer and

some of their numbers perish, as the spirillum of relapsing fever and the streptococcus of erysipelas. Facial erysipelas with a high temperature—over 40° C. (104° F.)—runs a quicker and more favorable course than wandering erysipelas, which often drags along for months with its regularly low fever.

For certain microbes the increased heat formation may increase the phagocytic activity of tissue elements and also the power of resistance of the tissues. I do not desire to regard the phagocytic theory as being unimpeachable, much less as proven. But if we simply consider the fact of the invasion of the body by so small but so innumerable a cellular host, and if we remember that the body must overcome them if it is not itself to perish, then we must admit that it can combat such enemies with nothing better than its own cellular elements.

It is by no means necessary—in fact, improbable—that the entire battle between the hostile intruders and the body cells is fought out alone by the white blood-cells. Why should not other tissues—cells of mucous membranes, pulmonary cells, connective-tissue cells, etc.—take part? Why must there be a specific phagocyte, just like a standing army, in the body? The whole doctrine of phagocytism has indeed not yet been proven, but it is so natural, from a biological standpoint, so self-evident and obvious, that had it not yet been proposed it certainly must have been so now. And even the arguments which have been advanced against it are not valid. The fact that patients convalescent from infectious diseases give off the germs in a living condition in the excreta only proves that all the bacteria are not destroyed by the cells of the body, a result which must be expected in any form of the phagocytic theory; for the very excretions, from their nature, are one of the resources of the body for freeing itself, even when fever and inflammation do not exist, from the intruding host. Thus if their number is lessened by means of the secretions of the mucous membranes, this becomes one of the body's mode of defence against the enemy, even if the latter is not destroyed or even if the phagocyte and the living bacteria are cast off together. Even Baumgarten's ingenious experiments are not conclusive against the phagocytic theory.

The giant cells with their inclosed tubercle bacilli in tuberculosis, their presence also in syphilis, even if they owe their

origin to the fusion of several phagocytes, and the possibility of a spontaneous cure of tuberculosis of the bones, glands, and of the lungs itself, observed by myself and others—all these corroborate this doctrine, all objections notwithstanding. We must not demand that the body be victorious in every case; we must not extend this theory to all the infectious diseases, nor must we limit too strictly the method in which the cells of the body defend themselves against the enemy. It is indeed not essential that every microbe should be consumed by the cells; their enormous numbers would render this impossible. It is, on the other hand, quite natural that certain microbes should destroy the cells—as, for example, the blood cells—by penetrating into their substance. The alteration in the chemical activity of the affected tissue produced by the febrile process may suffice to lessen the vitality of the attacking microbes.

But the fever itself, by the changes in the general metabolism from which it arises, may cause such alteration of the nutritive medium for many bacteria that, their virulence having been lessened, their further propagation in the body is rendered impossible; that biologically they are rendered sterile, and chemically their ptomaine formation is made harmless. Surely we cannot doubt the possibility that in the febrile metabolism there are produced leucomaines which, not considering the possible germicidal action of certain ptomaines, may lessen the vegetative activity of the microbes. An analogous condition is seen in the increased formation of acids in the muscles and other tissues in fever. The changes in the nutritive medium, combined with the rise of temperature, are certainly not to be undervalued in the curative action of fever.

What fever does as a general reaction of the entire body is also accomplished by inflammation as a local reaction to the local infection which has called it forth, or to the localization of a general infection. In the inflamed tissue we see the emigration of leucocytes which may also have a phagocytic action; we see the temperature reach a higher point than in other parts of the body; we observe a more distinct and more marked formation than elsewhere of abnormal metabolic products and chemical tissue changes which may possibly sterilize the nutritive medium. Thus the defence of the body against the living disease germs is also intrusted to the same means

which the body as a whole uses in the general manifestations of fever. We are, therefore, justified in attributing to inflammation the same reactive power which we have admitted to fever. Inflammation does even more, since the activity of the cells of the body, especially in mucous membranes, provides for the partial elimination of the innumerable bacteria; or by means of connective-tissue proliferation and cicatrization offers an almost insuperable barrier to the advance and extension of the local infection.

Thus fever, like inflammation, may be beneficial, provided the tissue waste is not carried to exhaustion. And that fever does not constitute the chief danger of a disease is proven by our daily experience. It is the febrile, acute diseases which are generally curable, even spontaneously; while the non-febrile, chronic maladies are healed with difficulty or not at all; and the non-febrile, more or less acute disorders have a very high mortality. Disregarding chronic rheumatic and spinal inflammations, it will suffice to mention the experience that the afebrile course of cholera and the feverless beri-beri—examples of acute and chronic infections—cause such an extraordinary loss of life, while typhoid fever, pneumonia, relapsing fever, dengue, and even small-pox under a simple hygienic treatment give much better results; and in the plague itself, according to its observers, there is a chance of recovery where very high fever is present. And what experienced physician has not observed in the convalescence of typhoid fever, that the higher the fever was the more the organism is fortified and rendered resistant against other infections, as if the prolonged and elevated temperature had effected a renovation in the typhoid patient!

And what can we say concerning the fevers lasting only one or two days, whose true nature is still unknown, which pass away without any treatment and leave no trace behind them? Here there are certainly infections from without, from the intestines, from other mucous membranes, since without a cause there can be no effect. But here the body has speedily subjugated the cause of the disease, has rendered impossible its establishment and propagation. Had this been unsuccessful, who can tell what disease might have developed from this ephemeral fever? The multitude of such abortive cases of disease should teach the practising physician something of

the power and the success of the reaction of the body. How many cases of typhoid fever are there in localities where this disease is endemic which are not diagnosed as a result of the typhoid infection, because the physician has not discovered any distinctly characteristic symptoms of typhoid fever and has contented himself with the diagnosis of a rheumatic, catarrhal gastric, "mucous fever," etc.! The laity must be satisfied with this diagnosis, because the physician does not wish or he may not dare to admit that he has not recognized the true pathological condition, especially as it runs so rapid and favorable a course without his interference. How many apparently simple catarrhs of the nose, eyes, and bronchi during the prevalence of an epidemic of measles are abortive cases of measles, and are spread by means of a chance change of wind, as we ourselves have often seen measles conveyed to places hitherto free from the disease, even to an island! And what shall we say of so many hyperæmias of the pharynx with mild fever during an epidemic of diphtheria or scarlet fever, often accompanied later on with albumin in the urine? What shall we say of the simple variolous pharyngitis during an epidemic of small-pox? What conclusions shall we draw from these facts concerning the difficulty or impossibility of preventing the spread of certain infectious diseases, which are so often disseminated and spread over large areas through the railroads by these apparently innocent cases, because they are abortive and not to be diagnosticated?

In these aborted cases of infectious diseases the ephemeral fever is the only sign of warning given by the attacked organism. Nothing results because the body soon subdues its antagonist, and it is beyond doubt that this is due to its prompt and energetic reaction.

We should, therefore, not wish to lessen or annihilate the fever. We may dispute whether fever is a local reaction of certain nerve centres or a general reaction of all or a majority of the tissue elements of the body. But as a function of reaction against the cause of disease, we must consider it to a certain degree beneficial when the hostile microbes have gained access to the system. It would be far better to search for remedies which will render the fever itself useless and superfluous to the patient, by annihilating or at least rendering innocuous to the body the cause and excitant of the fever, the disease germ.

Such, indeed, is the mode of action of quinine in malarial fevers, of mercury in syphilitic fever. But taken in a strict sense they are not true antipyretics; they are useless against other fevers; and even in malaria and syphilis they abate the fever, not because they are antipyretics, not because they can depress the bodily temperature and can restore the febrile metabolism to its normal condition, but because they abolish the action of the specific cause of a specific fever, *i.e.*, the fever itself.

And in fact quinine not alone cures malarial fevers and the irregular febrile movement dependent on malarial infection, but it also reduces malarial enlargements of the spleen which exist without fever, and eliminates the non-febrile paludal cachexia.

Quinine operates in malarial fever just as Lister's antiseptic method acts in traumatic fever, in septico-pyæmia; as carbolic acid and corrosive sublimate act when applied to the surface of a septic wound or injected into infected channels; as the frequent antiseptic douching of the vagina before, and of the uterus itself after, labor directly prevent puerperal fever. This is the etiological treatment of fever—not treatment of temperature, not a combating of the febrile process.

But such is not the mode of operation of all the antipyretics, or better named "antithermics," which are intended to replace quinine—in fact, to far surpass it as general fever remedies. Kairine, thalline, antipyrine, phenacetine exert no specific action on the cause of the fever; they depress the temperature partly by increasing the radiation of heat, but chiefly by lessening the heat production.

In this way they can only do harm, inasmuch as, without attacking its cause, they merely interrupt the course of the fever, the reaction of the resisting system against the cause of the fever; so long as their action continues they destroy, or at least lessen, the defensive resources of the attacked organism. They can depress the temperature and with it the febrile metabolism; they can, moreover, lower the increased excretion of urine itself by means of this lessened combustion of the tissues. Nevertheless they are of no benefit to the patient. Even in those cases where we have to deal with germs which thrive at the highest febrile temperatures and which resist all phagocytic action, even in these cases the

hope remains—and possibly the best established of all—that the alteration of the metabolism and the change in the culture medium brought about by the pyrexia will set a limit to the further progress of the pathogenic microbes. This invaluable result of the reaction of the body to fever is entirely lost by the employment of antipyretics or "antithermics" which reduce the temperature at any cost.

Rationally we ought not to allow ourselves to be carried away by the hope that by artificially depressing the heat production we can bring the febrile process to a stand-still. A diminution of the heat production is inconceivable without a similar diminution of the vitality of the organism and of its capacity for reaction and resistance. This, however, means poisoning. The degree of poisoning by means of which these results are attained is, of course, relatively trifling, inasmuch as the important vital nerve centres are spared; but it is nevertheless a form of poisoning, and if we meet very susceptible patients, if we administer excessive doses, or if we prescribe but moderate doses during the occurrence of a normal defervescence (as in pneumonia), we may observe dangerous symptoms of collapse, as has occurred in my own experience. In such cases the poisoning is evident; in the others it also occurs, but it only partially affects the activity of the heat production.

It is obvious that we can only advantageously combat fever with such remedies as do not attack the result of the fever, the increased heat production, but its cause, the excitant of the fever, as quinine does in malaria.

Bearing in mind the diversity of the pathogenic microbes which cause the various infectious diseases and the diversity of their reaction to germicidal and disinfecting remedies, it becomes evident that we must relinquish the idea of having or hoping to find such a remedy which will be efficacious in all infections and thus against all fevers, and at the same time be well borne by the patient. There are indeed disinfectants, sovereign poisons to every living animal and plant, remedies which destroy all bacteria, such as corrosive sublimate, carbolic acid, etc.; but, alas! in the doses which are necessary to kill the intruding bacteria they will much sooner destroy the life of the patient.

The problem is, therefore, to find remedies which, like

quinine in malaria and mercury in syphilis, administered in doses capable of being borne by the patient, will, if they do not kill the disease germs, at least render them innocuous. On science devolves the task of discovering such specific for the various infections, even though such discoveries be the result of chance. Then will the fevers of all the infections be rationally combated and subdued. In other words, we will then not subdue the febrile process, but we will render the pyrexia useless and spare the system its febrile reaction by disarming the disease germ, the excitant of the fever.

It is not impossible that among the antipyretics already discovered or devised, as well as among those yet to be announced, there may be one or more which will prove to be specific in certain infections and their accompanying fevers. But surely for the manifold varieties of disease germs there will be a number of specific remedies needed; a universal antipyretic which, while harmless to the patient, will render all excitants of fever equally inert, will, alas! always remain a vain hope.

But the matter assumes a different aspect when we consider the question whether in all cases a high fever only exerts an absolutely curative influence; whether under certain conditions more harm than good may not be done by the too elevated temperature; whether the accumulation of the heat produced in the body may not possibly be the cause of subsequent injury.

And here we must admit that an excessive accumulation of high temperature may debilitate the heart's action to too great an extent, may imperil the nerve centres, and to meet this danger a diminution of the excessive temperature may theoretically seem desirable. And this purpose may be accomplished theoretically by abstracting heat, without lessening the heat production itself, by cooling the heated body without influencing the further production of the reactive temperature.

For this purpose we may use the various hydro-therapeutic measures: the cold full bath, cold packs or cold affusions, and also baths either of lukewarm or running water, or of water which has been gradually cooled, etc. To a certain extent large draughts of cold water or high rectal enemata may also be of service.

It has been proven of all these methods that they deprive the body of large quantities of heat which is given up to the cold water, while at the same time they do not diminish, but rather increase, the heat production in the body. Recalling the fact which has been proved by Liebermeister and of which any one may convince himself, that during such abstractions of heat the axillary temperature does not sink, while the periphery gives off seven times more heat than is lost in ordinary clothing, we must infer that such abstractions of heat necessarily increase the production to a very remarkable degree.

The conclusion naturally following these considerations is that the heat abstraction, with its consequent cooling of the body, is of benefit only to a portion—the surface, of the body—and that the actual heat production is stimulated because of this abstraction.

These abstractions of heat thus aid the fever, in that although they cool off the body to a certain extent, yet taken all in all they nevertheless increase still further the combustion and tissue waste which has already been accelerated by the fever.

While theoretically they are to be condemned from the standpoint of a reduction of the temperature, yet practically they are to be commended for their favorable influence on the course of the disease.

And here the question naturally arises: Does the beneficial effect of these heat abstractions consist in their cooling action, or may it not perhaps be due to the increase of the febrile heat generation and of the combustion and waste of the tissues—in other words, because they increase the effects of the fever? May not the forced combustion produce still greater changes in the tissues and thus render them an even more unfavorable nidus for the germs than the fever has rendered them? Is it not the resulting highly-increased excretion of so many excrementitious substances—ptomaines, leucomaines—which diminishes the chemical poisoning in the circulation of the blood and in the tissues? May it not perchance be due to the increased combustion of the bodily tissues and of the blood which, thanks to the definite regulation of the temperature, is made possible by heat-abstraction, without causing the body to suffer by an excessive accumulation of heat, with-

out elevating the temperature to a degree which could not be borne by the heart and nervous centres?

And if this is the case (I purposely refrain from considering certain secondary results of the action of cold on the surface of the body, as especially all reflex effects, the expectorant action of cold baths in pneumonia, etc.), how different is the action of the abstraction of heat by cold baths, enteroclysms, etc., from that of the chemical antipyretics, which, even if they partly increase the loss of heat, nevertheless act chiefly by depressing the heat generation, thus leading frequently to collapse and algidity.

But the cold full bath, if used in cases of cardiac weakness or diminished power of reaction, is also capable of causing collapse by exhausting the heat production. It is just here that, owing to the excessive exertion of the body to replace the abstracted heat by increased combustion and accelerated consumption, for which purpose the enfeebled patient does not possess the means, and owing to the deficit in the economy, that the heat generation becomes exhausted.

With the antipyretics, on the other hand, it is the directly depressing impression made on the heat production, the directly hostile grasp on the chemical vital processes, which leads to collapse.

In the one case it is a transient increase, in the other a transient decrease, which comes into play. The former aids the fever reaction of the body in its ultimate purpose, the latter suppresses the reaction against the cause of the fever.

And if after the cessation of the mild heat abstractions the axillary temperature falls a trifle after a while, and this fall lasts but a few hours, the cause is no doubt to be found in the fact that the mild increase of the heat generation manifested during the mild heat abstraction (in behalf of the febrile balance of temperature) ceases sooner than does the increase in the radiation from the cooled surface; so that after the forced augmentation of the heat generation has ceased more heat is lost than is produced, because the body becomes accustomed, as it were, to the greater radiation and continues to give off more heat. Under such circumstances the radiation becomes a real cooling of the feverish body without depressing the reaction against the cause of the disease, without depressing the heat production, and without exhausting its

source. There is thus nothing in common between the cooling after-effect of the moderate heat withdrawals and the depressing effect of the chemical antipyretics.

The moderate abstraction of heat with cooling after-effect may be very easily accomplished by cool sponging, by cold packs, by not too cold full baths, by baths lukewarm at first, but rendered colder by the gradual addition of cold water. Thus the radiation of heat from the body to the water of the bath is not alone compensated and the heat abstraction continued at a certain degree, but also gradually increased.

This same effect may also be produced more completely, and by all means more safely, by means of cold enteroclysms, with which in all cases, and especially in typhoid fever, we could observe a slow but steady diminution for several hours in the axillary temperature. This effect is also very much facilitated by very copious draughts of cold water in typhus fever, in which by the daily consumption of five to six (eleven to thirteen) and in some cases of even ten to fourteen litres (twenty-two to thirty pints) of cold water, we regularly succeeded in causing defervescence while the eruption was still in full bloom.

Here the fact certainly deserves mention that certain diseases accompanied with high fever run a very favorable course when treated by means of diaphoretics and are much benefited by this mode of treatment, even though it is so unlike the abstraction of heat by means of cold. We will not speak here of the so-called acute articular rheumatism, nor of certain acute catarrhal affections in which, while resolving spontaneously without any special interference on the part of the physician, the body perspires so easily and so much. We shall simply recall pneumonia, which progresses just as well, and in some epidemics even better, with warm poultices as under cold-water treatment. But is not the profuse sweating of a patient a variety of heat abstraction? Does not the perspiring body radiate more heat at the periphery than when dry? Is not diaphoresis a compensatory method to lessen the accumulation of heat in the body?

It is indeed beyond doubt that the diaphoretic method, disregarding the increased excretion of noxious substances, is really a kind of heat abstraction which does not increase the production of heat, or at all events increases it less than does

the cold method. But generally the diaphoretic method is not applicable in all kinds of fever. In many cases in which it may be useful it certainly does less good than the cold method —possibly because it does not increase the heat production in the febrile patient, or increase it as much as the latter, and that it only facilitates the radiation of heat which has been accumulated by keeping the patient too warm. In this seems to be the chief difference between the two methods, which are both based on heat abstraction.

Let us also remember that, taken all in all, there is less curative action in the moderate abstractions of heat, which maintain the internal temperature to a lower degree and, therefore, do not increase the heat formation so much, than in the large withdrawals of heat. From this we infer that in the abstraction of heat the most beneficial effect is exerted on the patient not so much by the manifest cooling of the surface as by just the reverse—*i.e.*, the greater combustion of the body with the consequent effect on the general metabolism and the locally infected nutritive medium. However paradoxical this statement may appear, it is nevertheless warranted if, on the one hand, we consider clinical results, which are of vastly greater service to the physician than mere bald theory, and, on the other hand, if we estimate the very extraordinary increase of heat radiation in the cold bath as compared to the maintenance of the internal temperature, which could not be kept at the same degree without a considerable corresponding increased heat formation.

The cardinal difference between the hydropathic abstraction of heat and the depression of fever by chemical antipyretics lies, in my opinion, in the fact that the former increases the generation of heat, while the latter diminishes it; that the former permits the springs of the heat formation to flow more freely, while the latter dries them up.

The two antipyretic methods are, therefore, directly opposed to each other; and it must be admitted that impartial clinical experience may cheerfully value the one as useful, while it recognizes that the other may possibly be injurious.

Bearing this in mind, we find that fever itself is not the chief danger in a disease; on the contrary, it is necessary and, to a certain degree, a sign of the curative reaction in acute disorders. We therefore have no reason for desiring to re-

duce the fever as such. If certain remedies can almost with certainty subdue certain fevers and thus restore the patient's health, this is owing to the fact that these remedies contend not with the febrile process itself, but with the cause of the same. They thus act as specific germicides.

General antipyretics which are successful in every variety of fever do not as yet exist; and there never will be found a remedy which can successfully act on the manifold causes of fever and the variously reacting and resisting disease germs without at the same time injuring the patient. We must, therefore, restrict ourselves to lessening the accumulation of heat in febrile patients without lowering the heat generation itself—*i.e.*, the reaction. Hence hydropathic measures will always be desirable, while all chemical antipyretics will appear untrustworthy as general febrifuges.

Hence, if in general we do not wish to treat diseases accompanied by fever (which, it may be remarked, are collectively the acute infections) with the fashionable antipyretics and antithermic remedies of the chemical laboratories and drug-shops; if we prefer waiting and an equalization of the natural vital processes of the attacked organism to a direct antipyretic therapy in these diseases in which we possess no specific remedy against the causal factor, yet we do not wish to pose as a therapeutic nihilist. Therapeutic nihilism has had its day. It certainly rendered the invaluable service of having in a time of scientific barrenness destroyed the illusions of allopathy, of having explained the apparent miracles of homœopathy, and of having buried both of these two systems which ignore all natural agencies. It is to this therapeutic nihilism that we owe the recognition of the great power of natural recovery and the resisting capacity and the power of reaction of the organism.

To-day we are no longer allopaths, just as we could not be homœopaths. But neither are we any longer nihilists; we are simply physicians of nature—"physio-therapeutists" who highly value the etiological standpoint, especially the causes of disease, who pay special attention to the excitants of disease themselves, and where this is impossible anticipate their effects, and who follow the old doctrine of Hippocrates: "Quo natura vergit, eo tendere opportet." To-day we study the spontaneous resolution of diseases, and the knowledge thus gained

becomes an index to us for the rational method of treatment where we are unable to eliminate the cause of the disease itself.

The nihilism of the highly-esteemed Vienna school certainly was carried too far, and threatened to throw overboard the entire apothecary. This caused a reaction among experienced therapeutists, and the reaction was desirable and necessary. But unfortunately even it gradually went too far, and in league with all-powerful fashion, there resulted the present searching after new remedies, the over-estimation of experiments on animals, the over-valuation of purely symptomatic successes. It is this same spirit which threatens to again call into existence the old allopathy, an allopathy, it is true, as yet without venesection and with fewer vesicants than formerly, yet none the less an allopathy which in its methods of treatment pays more attention to the manifestations rather than the causes of disease, and which disregards the resources of the diseased organism which it may itself utilize to vanquish the disease and again restore health.

It is our duty as modern "natural physicians" to investigate thoroughly the necessary conditions which lead to spontaneous recovery, so that we may be sure that we may not render the recovery more difficult, if not doubtful. In this way only can we fulfil the first duty of the conscientious physician, not to do harm; the second duty, to assist, will then perchance be also rendered possible by this proper estimation of all the necessary conditions.

Let us, therefore, refrain from desiring at any cost to reduce the fever which in so many diseases is the physician's stanchest ally; let us rather strive to combat it in its causes and spare this necessary process to the patient. The tendency to search for general antipyretics to treat the febrile process as such without acting on its cause is a lamentable step backward in rational therapeutics. Against this abuse of such remedies we need only call attention, and in this connection it is certainly interesting to note that the conviction of the possible value of the fever is a very old one. Let us bear in mind the words of Boerhaave: "Quid est febris? Est naturæ irritatæ conamen ad expellendum stimulum inconsuetum," and the aphorism of Borsieri: "Quos interdum morbos remedia non curant, febris curat."

SOME

URINARY DISORDERS

CONNECTED WITH

The Bladder, Prostate, and Urethra.

BY

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SOME URINARY DISORDERS.

CHAPTER I.

THE PREVENTION AND EARLY TREATMENT OF PROSTATIC OBSTRUCTION.

In the course of lectures that is before us this month I hope to elaborate certain points connected with the diseases of the urinary organs which appear to me to be worthy of your consideration. It will be my endeavor to make these meetings gatherings for clinical objects rather than for the purpose of attempting any systematic description of the subjects to which they relate. With this view I shall be happy, as occasion offers, to supplement what I may have to say here by the ordinary work of the hospital as seen in the wards, and on my out-patient days.

Without occupying your time by any further prefatory remarks, I will proceed with the subject selected for to-day's consideration, viz., the prevention and early treatment of prostatic obstruction. And I must ask you to notice in the first place that I do not say the prevention and treatment of the enlarged or hypertrophied prostate, as I purposely confine myself to dealing with almost the only symptom, and that the most pressing one, which brings the enlarged prostate under the notice of the medical practitioner. Enlargement of the prostate to some degree is, I might say, the common lot of by far the greater majority of males who have attained sixty years of age or upward, being, I believe, far more frequent than what at first sight we might perhaps be disposed to admit. Not very long ago for the purpose of ascertaining this point I took the trouble to examine consecutively one hundred males who had reached their sixtieth year or upward, and out of these three-fourths presented undoubted signs by

rectal examination of this change. Of the number thus affected not one-fifth of them appeared in any way inconvenienced thereby, some to so slight an extent as not to complain. Nor are there grounds for asserting that because a person has an enlarged prostate a time will come, should he live long enough, when bladder trouble must necessarily supervene. I have watched many men with well-marked signs of an enlarged prostate for a number of years, and up to the time of their deaths, either by natural decay or by other diseases, without knowing them to be conscious of any inability so far as their urinary organs were concerned. But though persons may, either by good care, or good fortune, obtain an immunity from those troubles which prostatic enlargement not infrequently brings with it, there can be no doubt that they carry with them to the end of their lives the liability to suffer in a way which does not apply to those who have not undergone this structural change, a liability which may show itself without any sufficient notice or warning. It not infrequently happens, as we all know, that a sudden attack of retention of urine, probably traceable to some definite cause which might have been avoided, is the first indication that an elderly man has an enlarged prostate. As a matter of practice it is as an obstacle to micturition that the prostate comes under our notice as surgeons, and this for the most part shows itself, at all events to persons accustomed to observe, by gradual indications rather than by the sudden and unwarned cessation of the physical function of micturition. In far the larger number of cases, even in those where apparently the urinary breakdown is sudden and unexpected, and where the prostate eventually proves to be a serious cause of obstruction, the process is a gradual one, and is not unlike what is commonly observed in connection with other obstructive diseases of the urinary apparatus. Hence I consider that with our present knowledge, and in face of the facts to which I have briefly referred, we, as practitioners, will do best by approaching the subject in relation to obstruction rather than in reference to a mere increment in bulk of which the individuals may never be conscious.

These cases, however, of much enlarged prostates unattended by symptoms of such a kind as to constitute disease, have been of great interest to me, and the study of them led

me some years ago to suggest certain lines of action in practice which seem to me to have yielded some excellent results.

In a number of specimens of this kind it was impossible not to notice that the form assumed by the prostatic growth relative to the outlet from the bladder exercised a considerable influence in determining the presence or absence of symptoms of urinary obstruction. In some forms of enlarged prostate, though the growth was not excessive, the obstacle to micturition was most complete, while in others, though the mass attained a very considerable size, it was quite apparent how it happened that the expulsion of urine from the bladder was so little interfered with. By the kindness of my friend, Professor A. Barron, I am able to bring under your notice to-day an example about which I attach considerable importance in reference to this special point I am now addressing you upon, and I attach this importance to it chiefly on two grounds (1) because it illustrates how it is that the process of micturition need not necessarily be interfered with by the growth of the prostate, and (2) because it shows a natural adaptation of the parts which I shall endeavor to demonstrate to you, is capable of being imitated.

The specimen you will see is one of considerable enlargement of the prostate; it is taken from a middle-aged man about whose exact age there seems to be some doubt, but who probably was rather under than over that period of life when this change usually commences. He was under observation for eleven days before he died; he had never suffered from any difficulty in urinating, though the act of micturition was more frequently performed than is usual with persons at his time of life. If we look at the specimen, we can at once see how it was that, in spite of the general enlargement, there was no marked impediment to the escape of urine along the urethra. You will notice that what is known by the somewhat incorrect term, as the middle lobe, is deeply grooved in the centre so as to give a bi-lobed appearance to the part. Having frequently noticed this process of channelling or grooving in connection with those cases of enlarged prostates where micturition was not interfered with, in 1881 I drew attention to this point with the view of showing that it was capable of being artificially produced with permanent advantage to the patient.

About that time a case came under my notice which seemed

to confirm the views I was then putting into practice. It was that of an elderly gentleman, well known to me, who, in the belief that he had an enlarging prostate, of his own will and idea took means which seemed to him would be likely to prevent the occurrence of retention of urine. Long before I knew him he had been told that his slight urinary troubles were the early indications of an obstructing prostate, and that he might find himself on some occasion unable to micturate. This so alarmed him that for many years, and almost up to the time of his death at an advanced age, and from other causes, he never allowed a day to go by without passing a full-sized bougie for himself. He remained quite free from any urinary inconvenience, a circumstance which was attributed by him to the means he had adopted. I made a post-mortem examination of him, and found that though the middle lobe of his prostate was considerably enlarged, the level and distensibility of the prostatic urethra were in no way altered, the growth or enlargement being deeply grooved. It appeared, to use the phrase of my patient, that the "maintenance of the water way" was directly traceable to the persistent catheterism that had been most gently and effectually performed. In the further extension of this practice my object has been to mould the growing prostate, and not to endeavor to dilate it, or to procure its absorption as had previously been done by Mercier, Physick, Skey, and other surgeons.

When there is evidence that the prostate, by its increased bulk, is beginning to obstruct micturition, when we endeavor to supplement an imperfect action of the bladder by repeated trials and failures, or when the residual urine which in some degree is nearly always a concomitant with an enlarged prostate is seriously harmful to the individuals either by its quantity or quality, then mechanical treatment in the direction I have indicated may often be resorted to with great and permanent advantage. But there are other grounds except those immediately connected with the function of the bladder, which seem to force upon us the importance of the mechanical treatment of prostatic obstruction at a far earlier date in its history than has hitherto been generally practised. Take the evidence that is afforded by the state of the urinary organs above, namely, the bladder, the ureters, and the kidneys, as

showing what the back pressure of the urine in some cases of prostatic obstruction is capable of effecting. In the post-mortem record of the specimen I have just shown you, where during life there was no reason for suspecting that any appreciable degree of obstruction existed, it is stated "the kidneys were fibroid and atrophied, the two weighing ten ounces, many small subcapsular cysts, early hydronephrosis, no pyelitis. Ureters dilated, bladder dilated and fasciculated." Supposing a surgeon accustomed to see the pathological effects connected with urethral stricture had a specimen of this kind before him in an instance of the latter disorder, I can imagine him saying to his class "here we have an illustration of the enormous and fatal damage that urine pressure is capable of exercising on the important parts above a stricture; these results are in their nature entirely due to mechanical causes, and might have been prevented had means been taken sufficiently early."

Apart, however, from this consideration, it is important to notice what an unfortunate condition of the organs is presented should in the course of the prostatic disorder retention of urine attended with cystitis, as is often the case, supervene. We have the whole of the urinary apparatus from the kidneys downward laid open as it were to the influence of an inflammatory attack of a most putrid character. Can we wonder that what is commonly called a surgical kidney is one of the most natural results?

But though the more remote consequences of prostatic obstruction are for the most part analogous with those observed in connection with urethral stricture, little seems to have been done to prevent their occurrence. This appears to have been due in a large measure to our failing to recognize the possibility of maintaining in spite of overgrowth a prostatic channel for the escape of urine from the bladder quite as efficient, as I have endeavored to show, nature herself frequently provides, and which is not liable to that kind of contraction which nearly all strictures constantly undergo. In the next place our forefathers were ill provided with instruments adapted for such purposes, the old metal long curved catheter being almost always associated with any prostatic disorder. I do not think we fully appreciate the great improvements that have taken place within comparatively

recent years in the construction of these appliances, and the comfort that has been conferred on those requiring such assistance.

Frequency of micturition may oftener be regarded as a sign that the prostate is commencing to obstruct, than any other symptom. As with a urethral stricture a person by the exercise of muscular force will often maintain a very fair stream of urine, though the dimensions of the canal are considerably reduced, so will an individual with a large prostate compensate to a certain point for efficiency by a frequent performance of the act of micturition. Hence it behooves us in all cases where there is an absence of other causes of irritation, such as are presented by stone, tumor, inflammation, or the condition of the urine, to regard frequent micturition in an elderly male, as an indication that he is probably suffering from an early form of prostatic obstruction. The presence of this symptom in an inconvenient degree and in the absence of any other cause such as I have indicated, is sufficient to warrant a physical examination of the suspected part. The discovery of some enlargement of the prostate by exploration of the finger in the rectum is *prima-facie* evidence that the frequency in micturition is merely an indication that the growth is commencing to interfere with the proper performance of micturition. Such being the case, it is hardly necessary to point out that the artificial rest to the part which is frequently obtained by the use of opium and belladonna suppositories, except so far as removing spasm is concerned, is really an interference with an adaptation in the manner of conducting the process of micturition which is essentially associated with the altered physical condition of the parts. If in a system of water works you materially alter the shape and structure of the main valve at the outlet, you can hardly expect that the discharge will be the same as under the previous *régime*.

And now I will proceed to show you by what means we may contrive to improve matters when there is evidence by the symptoms it provokes that the enlarging prostate is assuming a shape where urination is, and will probably continue to be, increasingly obstructed. Having drawn my first illustration from what nature will spontaneously do in reference to this difficulty, I will take a second one from the same source

before I proceed to notice the mechanical contrivances which may, under such circumstances, be used with advantage. Persons with large prostates and who are not inconvenienced by them are quite unconscious of the spontaneous process by which the conservation of their urinating powers is preserved. It is not by a rapid destruction or alteration in tissue consequent on some violent inflammation where, as we sometimes see, a permanent advantage follows, but by the induction of a process of which we are absolutely unconscious, and this fact must be uppermost in our minds, so that we may so guide our efforts as nearly as possible to imitate that which nature does not only with impunity, but with so great and permanent advantage.

With the object I have now in view, I would in the first place say that bougies are, as a rule, to be used and not catheters. I am quite sure that unless there is some special reason for it, it is a great mistake to interfere with that degree of residual urine which is met with in most cases of prostatic obstruction, especially in its early form. What we have to do is to bring about such a conformation of the outlet from the bladder as to render residual urine unnecessary. Apart, however, from this point, which is an important one, it must be remembered that a flexible bougie generally enters the bladder much more easily than any catheter, as the stiffening which the eyes of the latter entail render it less capable of adapting itself to the canal. The special instruments I employ for moulding the prostatic urethra are of three kinds—the whip bougie, the ordinary olive-headed instrument, and the bougies *à ventre*, or bellied bougies, which I first introduced some years ago for this purpose. I prefer the last-mentioned (Fig. 1), in reference to which I can only indorse what I wrote of them nine years ago, ("The Prevention of Stricture and Prostatic Obstruction." 1881). Whatever instrument is selected, care should be taken to ascertain that it can be used easily and without causing pain, as the object in view would thereby be defeated.

The narration of a single case of some years' standing will enable me to complete the particulars which seem to me to be of importance in connection with the modelling treatment of prostatic obstruction. In 1883 a medical man, æt. 62, consulted me for symptoms which he was inclined to attribute to

a stone in the bladder. For some months he had been suffering from extreme irritability both by night and day, and particularly in the morning on rising. He was engaged in an active life, and the urgent desire to micturate every two or three hours became extremely irksome and inconvenient. He had a great dislike to any instrumental interference, and up to the time of my seeing him had refrained to use a catheter, although he had been frequently urged to do so. His habits and modes of life had always been extremely temperate and regular. Examination by the finger in the rectum showed that he had a moderately enlarged prostate. As he wished to be searched for stone, the introduction of the sound showed by the manner in which the handle of the instrument had to be depressed to enter the bladder that the floor of the prostate was very considerably elevated and enlarged. There was no stone nor evidence of any disease except the enlarged prostate. There were about two ounces or rather more of healthy resid-

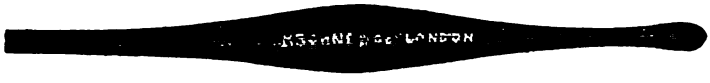

Fig. 1.

ual urine. Having explained the nature of the case to him, I advised him not to use a catheter, but to accustom himself to the regular introduction of a suitable bougie. To commence with I gave him one of the whip bougies, which I was then introducing into practice, and asked him to pass it every second or third night on going to bed. In the course of three weeks he got quite accustomed to this very simple form of instrumentation, and I then substituted the smallest size bougie *à ventre* or prostatic dilator as previously described. He passed this for himself on going to bed about twice a week, and very gradually increased the size of the instrument by three or four numbers. He reported himself at the end of six months, having persistently carried out this treatment in conjunction with the pursuit of his ordinary business. His condition then was as follows: His propulsive power in urinating had increased, the irritability of the bladder had gradually subsided, the calls to urinate being hardly more frequent than normal, and the amount of residual urine had diminished from rather over two ounces to a little less than four drachms.

Nothing else had been done medicinally except the treatment I have mentioned. I saw this gentleman casually two years afterward, and learnt that he was as well as ever. He told me that he did not think there was the least necessity for using his instrument, but as it was no inconvenience to him he preferred doing so once a week just before going to bed. His urine was acid, and in other respects healthy, and the bladder completely emptied itself.

A useful commentary on this case was suggested to me by the remarks of another medical man to whom I was relating it. "How is it," he said, "that I have not derived a similar benefit? I had to commence the catheter life fifteen years ago, and a day has never gone by since without my passing into my bladder a No. 10 English flexible catheter at least twice in the twenty-four hours." My reply was this: "You did not commence to draw off your urine until atony of the bladder had proceeded so far that you could not get on without this expedient, and when by the regular and persistent use of your catheter nature found out that muscle was not necessary for your act of micturition, either in part or in whole, she ceased to supply it. I have not the least doubt that my friend whose case I have just related would have been in a similar position to yours had we in the first instance supplied him with a catheter instead of a bougie, and told him to go on using it."

Before closing this chapter I should like to make a few remarks in reference to the larger class of cases, namely, those who have hypertrophied prostates but are in no sense inconvenienced by them. As I have said before, a person so circumstanced must be regarded as more liable to some sudden urinary disturbance than one who is not. Hence I have been in the habit of enumerating a few points which in the management of elderly males have proved of service.

1. To avoid being placed under circumstances when the bladder cannot be emptied at will. Nothing is so bad for a large prostate, though it may be working satisfactorily, as an enforced retention. It is often the first cause of a permanent atony.

2. To avoid checking perpiration by exposure to cold, and thus throwing additional work on the kidneys. In climates like our own, elderly persons should, both in summer and winter, wear flannel next the skin.

3. To be sparing of wines and of spirits (if used at all), exercising a marked diuretic effect either by their quantity or quality, select those which promote digestion without palpably affecting the urinary organs. A glass of hot gin and water, or a potent dose of sweet spirits of nitre will not do anything to remove the residual urine behind an enlarged prostate.

4. To be tolerably constant in the quantity of fluids daily consumed. As we grow older our urinary organs become less capable of adapting themselves to extreme variations in excretion. Therefore, it is desirable to keep to that average daily consumption of fluids which experience shows to be sufficient and necessary. How often has some festive occasion, where the average quantity of fluid daily consumed has been largely exceeded, led to the over-distention of a bladder long hovering between competency and incompetency. The retention thus occasioned, by suspending the power of the bladder, has frequently been the first direct step toward establishing a permanent, if not a fatal, condition of atony or paralysis of this organ.

5. It is important that from time to time the reaction of the urine should be noted. When it becomes alkaline or offensive the use of the catheter may be necessary. When a catheter is required it is most important that its selection should not be entirely left to the instrument maker. There are other points to be considered beyond the fact that it is to serve as an artificial outlet for the urine from the bladder. An unsuitable catheter in a prostatic case may do much permanent harm.

6. Some regularity as to the time of performing micturition should be inculcated. We recognize the importance of this in securing a regular and healthy action of the bowels, and though the conditions are not precisely analogous, yet a corresponding advantage will be derived from carrying out the same principle in regard to micturition.

Of the medicines I have found most useful in conjunction with mechanical means in restoring the tone of the bladder, I would mention here the ergot of rye which I generally give in the form of the fluid extract in cinnamon water. Its value in promoting muscular contractility is generally recognized. In my next chapter I shall consider the treatment of some advanced forms of prostatic obstruction.

CHAPTER II.

THE OPERATIVE TREATMENT OF ADVANCED FORMS OF PROSTATIC OBSTRUCTION.

I HAVE selected this subject for our consideration in this chapter, and I would again remind you that I confine myself to dealing with the single symptom of obstruction to micturition, quite independent of any size that the prostate may assume, knowing well that hypertrophy may occur without causing the individual such an amount of inconvenience as to demand surgical interference.

As I have said before, obstruction to micturition may be a process of gradually increasing difficulty, or one suddenly brought about by some casual circumstance which may or may not have been avoided. Whatever may be the mode of its incidence, we frequently meet with persons whose function of micturition is entirely and permanently spoilt by the difficulties and complications attendant upon a large prostate. So long as a person so circumstanced can keep himself comfortable by the use of a catheter, so long as the calls for this instrument are not of such frequent occurrence, both by day and night, as to seriously interfere with his health, or to prevent him earning his subsistence, I do not think that further measures are likely to be called for, unless under very exceptional circumstances. Surgery, however, has to provide not only for the ordinary course that a disease is likely to take, but for all the contingencies to which it is liable. Hence I propose to consider in the first place the conditions to which catheterism alone is inapplicable as failing to give sufficient relief, and secondly, the varieties of relief for such states as surgery offers.

I do not think there is any phase connected with advanced forms of prostatic disease which is more intolerable and wearing to the individual, than that ceaseless desire to evacuate the bladder which is occasionally met with. Yet in practice, instances will come under your notice where the

whole life of the individual both by day and night, is as it were given up to the single act of introducing the catheter. Here the instrument, as a patient once said to me, becomes a Tantalus of the worst form, as not the slightest relief follows its application. Then there are cases where the mechanical act of introducing the catheter is an increasingly difficult one by reason of the obstacle that the growing prostate presents. A patient who has been using a catheter for some time with great advantage finds that he has to select a smaller size, then he tries a different shape, and so he goes on until at last both he and his medical attendant discover that there is always difficulty, whatever kind or size of catheter is used. Then hemorrhage attends these trials, at first occasionally and afterward constantly, and this is frequently followed by cystitis and other complications, among which orchitis may be mentioned. This condition of affairs does not often last long unless some easier mode of evacuating the urine is provided.

In a third class of cases you will find that in the course of its growth a portion of the prostate, in the form of one or more pendulous growths, encroaches upon the interior of the bladder and keeps up a constant state of cystitis, often far in excess of what is seen associated with the most irregular stones. Here the urine is generally loaded with a muco-purulent deposit, in which particles of blood will frequently be noticed. Further if you look at specimens of this kind which will be found in any pathological museum, the ureters will be seen to be patent and largely dilated, evidently showing not only how great the obstruction has been, but how easily the damage may enter the interior of the kidney. What can catheterism and washings-out do for cases coming under this category? Then there are instances of a very exceptional nature where the ordinary modes of treatment are inapplicable. In one case that occurs to me the prostatic urethra became so inordinately sensitive, and the spasm that catheterism excited in the prostatic urethra so great, that the patient actually wore an instrument in his bladder, more or less constantly for over two years. I believe this case was in the first instance one of those rare ones of prostatic fissure, analogous in many respects with what is seen within the anus and the female urethra. I operated upon him three years ago, dividing his prostate, and at the same time removing some secondary phosphatic calculi. He is now

alive and well and though he passes his urine more frequently than natural he has never since had occasion to use a catheter. Though in the majority of instances the advanced forms of prostatic obstruction are arrived at by a process of increasing difficulty in urination, the disease sometimes assumes this position without giving anything which could be spoken of as an adequate warning. Retention of urine, following apparently some trivial cause, suddenly occurs and the practitioner finds himself face to face with one or more of the complications to which I have just referred. There is great difficulty in introducing or reintroducing the catheter by reason of the form the prostate assumes; the retention of an instrument in the bladder is intolerable to the patient, if it is tied in it is withdrawn and all the trouble and pain connected with its reintroduction have to be repeated; or the engorged condition of the parts is attended with hemorrhage which recurs every time instrumentation has to be practised. These are phases of the acute form of obstruction which most practitioners are not only familiar with, but who know from experience how futile catheterism alone has proved under such circumstances.

For the relief of these difficulties, whether occurring gradually or suddenly, various methods of treatment have been practised, to which I shall now refer. In dealing with this part of my subject to-day, I hope I may be pardoned if I do so from a somewhat personal standpoint, as I think it will be seen that I have taken a considerable interest, not entirely in a passive form, in this aspect of the question.

In 1881 I published the particulars of a case where to meet the pressing difficulties connected with an obstructing prostate such as I have just referred to, I adopted an expedient which I believe was entirely novel at the time. I had long felt that the operation of puncturing the bladder from the rectum for retention of urine in cases of an enlarged prostate was one that could only be recommended for a very temporary purpose, inasmuch as it was impossible to retain the tube sufficiently long in such a position as to permit of an adequate degree of bladder drainage being practised with any regard to the comfort of the patient. Nor did the supra-pubic method of puncturing the bladder, and retaining a tube in this position recommend itself to me, chiefly on the grounds that it seemed to me to be neither a convenient spot for the patient,

nor was it sufficiently dependent to secure perfect drainage. With these views in my mind, I determined to puncture the bladder, when the necessity arose, from the perineum through the enlarged prostate, and to retain a drainage-tube in this position as long as might be necessary. In the instance I am now referring to, the patient was a man of 84 years of age, who was much reduced by an advanced form of prostatic obstruction. Though a catheter could be introduced, I clearly saw that unless some more efficient and direct method of urine drainage was provided, he would speedily sink. Under these circumstances, I tapped the bladder from the perineum through the large prostate with the instrument I had prepared for this special purpose, and which I will now show you. The operation of tapping the bladder when distended from this position is one that is not attended with any difficulty. The point of puncture is one inch in front of the anus, and the direction in a line toward the umbilicus. The trocar is so devised that urine escapes from the handle of the instrument immediately the interior of the bladder is reached. In the instance now under notice, the patient was at once relieved, and in twenty-four hours he was up, sitting in an easy-chair —an important matter with old people. I will not trouble you with the details of this extremely interesting case as they have already been published in full ("Surgical Disorders of the Urinary Organs." Third edition. By Reginald Harrison). For about six weeks after the bladder was tapped, the patient passed urine entirely through the prostatic canula, and he was able to go about as if nothing ailed him, by means of a tube apparatus specially adapted for this purpose. Then it was noted that urine, in gradually increasing quantities, began to flow through the natural passage, indicating that the prostate was ceasing to obstruct. The canula was removed six weeks after the operation, the wound completely closed in the course of a few days, and the patient entirely recovered. He died at the age of 90 without any recurrence of his prostatic troubles. What was most interesting to observe in this case was the prostatic atrophy that seemed to follow the operation. I examined this patient two years after the operation, and could find no evidence that the prostate was enlarged. I have had on two occasions to repeat the operation, with results entirely corresponding with the case I have related more

at length. I have not yet been able to collect the evidence in reference to the shrinking of the prostate which has followed this procedure, but my own observations in reference to this particular point have been corroborated by others. Mr. Weston, of Stafford, has kindly given me the particulars of a case of a very similar nature, where, after the operation, a very considerable diminution in the size of the prostate was observed.

But though this method of proceeding was especially applicable to those extremely rare cases of retention of urine due to a large prostate, where it was thought that no catheter could be introduced, it seemed to me that there were others which would be more advantageously dealt with by an opening from the perineum, which would allow of digital exploration of the enlargement followed by drainage. This procedure formed the subject of a communication I made before the International Medical Congress at Copenhagen in 1884. It consists in puncturing the membranous urethra on a grooved staff in the median line of the perineum sufficient to permit the introduction of the index finger within the prostatic urethra, to this extent resembling Cock's operation. Having thus obtained access to the interior of the bladder by a very limited incision, I have dealt with the prostate in three different ways. (1) By a division of the floor of the prostate as a preliminary to the insertion of a drainage-tube. (2) By the enucleation or removal of some portion of the prostatic mass before putting in the tube. (3) By the insertion of the drainage-tube alone. I have now operated in these ways on something like thirty-five cases of advanced prostatic obstruction, excluding malignant growths, in males over 60 years of age, for reasons such as I have stated, where catheterism proved insufficient to give adequate relief. In eighteen of these cases, either the floor of the prostate was divided, or a portion of the enlarged prostate removed before the drainage-tube was introduced, while in the remainder the perineum was opened merely for the introduction of the tube. I should like to say a few words about these operations, which have now ranged over somewhere about seven years, and the points that I would speak to on this occasion are these: (1) The risk of operations of this kind. (2) The present or subsequent condition of the persons, as far as I know, who have been thus treated. (3)

The effects that may have been observed on the enlarged prostate. Of the deaths, I only know of three, one a week after the operation, and another four weeks, and the third two months afterward. In these instances the patients, judging from the condition of the kidneys and ureters from previous back-pressure, lived longer and more comfortable than they would otherwise have done. One man, aged 68, died over six months afterward from a paralytic seizure. During this illness it was not found necessary to use a catheter for him. Two persons died over twelve months after the operation, from causes that I have not been able to ascertain, but as in this interval they had been well and active, they can hardly be included in the list of mortality. What, I would ask, would the mortality have been, had all these cases been left to endure the troubles that attend constant catheterism under difficulties? Of the remaining tweny-nine persons, something is or has been known of nineteen of them, at intervals of time over twelve months after the operation. Three of these have a permanent opening in the position of the wound. Two of these catheterize themselves in this way, and report themselves as perfectly well. The third had, in addition to an obstructing prostate, a tight urethral stricture, and now micturates at natural intervals through the perineum without the aid of the catheter. Of the sixteen whose artificial openings have soundly closed, ten are quite independent of the use of the catheter, three of them being extremely feeble by reason of advanced years. Of the remaining six, four have to use the catheter as before the operation, but do so without difficulty, or without causing hemorrhage. The two remaining cases have in addition had temporary difficulty in catheterism. In one of these the obstacle seems to have been due to the impaction of a calculus from which he has occasionally suffered for some years. Of the remaining ten, of whose condition nothing is known or can be ascertained, four are believed to have left England altogether.

And now I come to the third question which a retrospect of these cases suggests, namely, Have any effects on the large prostate been observed? I have already stated that shrinking of the enlarged prostate has been known to follow when the bladder has been tapped through it, and the canula retained for some time. I am equally certain, and have pointed

it out to others, that I have seen the same shrinkage occur where the urethra has been opened, and a tube introduced for the purpose of drainage without any damage being inflicted by section, puncture, or otherwise on the prostate. This has been more or less evident in the majority of the 19 cases previously referred to, in some to a very marked degree. Hence one is less surprised at finding the marked and permanent benefit in micturition which some of the cases referred to undoubtedly presented. This observation has led me to inquire as to the precise circumstance connected with this class of operations on the enlarged prostate which seemed to have been coincident with this extremely important change. The facts appear to point to the inference that where the bladder is drained incontinently for some weeks, I speak of from three to six weeks, an enlarged prostate will undergo a palpable degree of shrinkage, and I make this statement on the ground that where the drainage has been thus prolonged the urine will be found to force its way in spite of the tube along the natural passage. I have noticed this on so many occasions that when it happens I take it as a sign that the tube may be removed. That it has proved a correct signal I have not the least doubt, as healing of the wound has rapidly followed. Further than this evidence was also afforded me on several instances that the diminution in size was apparent to the finger from the rectum. If, as I have ventured to suggest, hypertrophy of the prostate is directly associated with the large amount of muscular element that enters into its composition, it is not surprising that the induction of a state of complete physiological rest should be followed by the result I have noted. However this may be, the fact remains unaltered.

Before referring to the details connected with my method of operating and illustrating it, I should like to briefly refer to the practice of supra-pubic prostatectomy which has been recently introduced by Mr. McGill, of Leeds. Taking advantage of the improvements which have been so warmly advocated by Sir Henry Thompson and others in regard to this way of opening the bladder for stone and other tumors, Mr. McGill has utilized it for the purpose of removing more or less of the hypertrophied prostate. At the Leeds meeting of the British Medical Association last year, several patients were exhibited, who certainly derived great and I believe permanent

benefit from the operation. When, however, the subjects and the circumstances of supra-pubic prostatectomy are taken into consideration, I do not think that it is an operation which is likely to be very extensively employed. In hale elderly persons where the evidence is very conclusive that a prostatic mass is projecting into the bladder and irritating it, we may occasionally avail ourselves of it with advantage. With the old, feeble, and broken-down, who oftener than otherwise furnish the victims of advanced forms of prostatic obstruction, we must be content with measures which, while affording immediate and complete relief, entail far less strain on the reduced powers of repair of the individual than is implied by a supra-pubic removal of more or less of the prostate. For this reason especially, in addition to others, I am inclined to limit the operative procedure to the opening and draining of the bladder from the perineum as affording a mode of relief which, so far as I have observed it, is unattended with risk and is capable of giving not only immediate but permanent relief.

And now I will refer to the details connected with my operation. The patient being placed in the lithotomy position, a staff with a median groove is passed into the bladder. There may be extreme difficulty, from spasm chiefly, in introducing this or any other instrument up to the time the anæsthetic is administered, but when this is done I have always found the obstacle at once disappear. The staff being held in position, the perineum is punctured with a knife one inch in front of the anus, sufficient to enable the index finger of the left hand to be placed on the groove in the staff. No dissection is at all necessary or desirable. If the perineum is very deep I sometimes clear the staff at the bottom of the puncture with a blunt knife I had made for this purpose. The groove having been bared, the small gorget is made to slide along it into the bladder, the handle of the staff being drawn toward the operator to facilitate this movement. Then the finger can be passed within the prostatic urethra. If the latter is felt to be tolerably clear, the tube may be at once introduced into the bladder. If the condition of the prostate is such as to offer any obstacle to the passage of the finger or the tube I then introduce a curved probe-pointed knife fairly within the bladder and divide the floor of the prostate directly downward. This is best done from within outward. In three instances I

have also removed more or less pendulous portions of the growth. The stiff tube is then introduced and retained usually from seven to ten days, then a soft tube is substituted. For the latter purpose I have employed a contrivance suggested by Mr. Annandale, which enables the patient to get up and go about, as shown in the figure (Fig. 2). The soft tube which is tucked into the waist belt is connected with the perineal tube, so that when the patient desires to pass water all he has to do is to let down the former, and turn a tap which is attached to it. Drainage has thus been carried out in the instances I have already referred to from ten days to six weeks. When it is found that in spite of the tube the urine forces itself, as it will do, along the whole length of the ure-

FIG. 2.

thra, this is a signal that the drainage may be discontinued and the opening allowed to close. The time the tube should otherwise be retained depends of course on the conditions that each case presents. So long as the urine remains alkaline and offensive so long must it be utilized, not only for drainage but as the most convenient way for washing out the bladder. For the latter purpose I find in the first instance a solution of boracic acid, a drachm to a pint of tepid water, most serviceable. If under the use of this the urine does not become normal I usually substitute the neutral sulphate of quinine in the proportion of two grains to the ounce of water. Creolin has recently been used for a similar purpose, but I have not yet tried it sufficiently often as to be able to speak to its virtues. I will conclude this lecture with the narration of one of my earliest and also one of my most recent cases.

The first was a man, æt. 73, in February, 1884, when he first came under my notice. For some months he had had to practise catheterism for an enlarged prostate with a considerable amount of residual urine. After a time there was increased difficulty connected with the introduction of the catheter, and serious hemorrhage frequently took place. His desire to urinate and his strainings were incessant, and nothing, after three weeks' trial with various kinds of instruments, appeared to give him any relief. In February, 1884, he underwent perineal prostatotomy, and wore one of my tubes continuously for seven weeks. The wound closed within a few days after drainage was discontinued. I saw him at intervals for two years after the operation. He remained quite well, and never had occasion to resort to the catheter again. On several occasions I passed an instrument for him, and could find no obstruction in the prostatic urethra, nor did his residual urine exceed a few drachms. This man was rapidly sinking under the irritation, caused by the constant use of the catheter, and there was no doubt in my mind that his improvement was due to the drainage that was practised.

The most recent case was that of a man, æt. 75, whom I saw in consultation with Mr. Woodforde, and who subsequently was admitted into St. Peter's Hospital for treatment. The history and particulars of the case were as follows: He had had retention of urine and frequency in micturition for eighteen months. For the past six months the desire to urinate had been constant, and was practically unrelievable by the catheter. When I first saw him he was using the instrument every hour both by day and night, the urine being most offensive, and loaded with pus and mucus. As various means for washing out the bladder had been tried, I suggested his being admitted into hospital. Shortly after his admission into St. Peter's I introduced a grooved staff and opened the perineum for the purpose of putting a drainage-tube into the bladder, as I have already described. The tube was worn for a week in spite of a good deal of prostatic spasm, when he was able to return to his home. The stiff tube was then replaced by the softer apparatus. Unusual difficulty was experienced in wearing the latter in consequence of the severe spasms that occurred. In time, however, this subsided, the condition of the urine improved and the wound speedily healed on the re-

moval of the tube. In spite of the difficulty connected with the retention of the drainage-tube, the only instance where in my practice this has occurred, the man's condition is now (six months after the operation) as follows: In the daytime he can get about and follow his employment without having to use a catheter. During the night he passes his catheter twice, and sometimes thrice, as he considers that it is an advantage to him, though I have no doubt he could dispense with it. On each occasion I have examined it his urine has been normal. There can be no doubt that though the circumstances connected with the operation were not as favorable for success as I could have wished, this patient's condition since the operation is a greatly, and, I believe, a permanently improved one.

CHAPTER III.

POINTS IN THE THERAPEUTICS AND HYGIENE OF THE BLADDER.

As in other directions, I shall hope to show that progress has been made, not only in reference to the more strictly operative measures connected with the urinary organs, but also in all that relates to the therapeutics and hygiene of this class of affections.

In comparing the various systems of which the human body is built up, such for instance as the nervous, respiratory, circulatory, digestive, and urinary, in addition to others that might be mentioned, it appears to me that the urinary more especially enjoys a condition for the action of drugs upon it which is not equally shared by the other contributing systems, except perhaps by the digestive. For, as I shall presently have to demonstrate to you, not perhaps chemically, but at all events clinically, we apparently derive much of our force relative to drug action on the urinary apparatus by the direct control of certain agencies which it is the special province of the kidneys to eliminate, in addition to those general effects upon the body as a whole which the particular drug in question has the power of exercising.

The physiological action of drugs on the urinary apparatus in its general and special application is far too large a subject for me to approach on an occasion such as this, even if my limited knowledge of it as a practical surgeon permitted me under any circumstances to undertake a discussion of this kind. I must therefore limit myself to one aspect of the question with the view of pointing out certain properties of normal urine relative to the tissues with which it comes in contact, the effects which are thus produced and how the latter may be modified for surgical purposes.

That normal urine possesses by the decomposition of its urea the power of acute tissue destruction is evidenced by those cases of extravasation of urine which most frequently

occur in connection with injuries to the urinary organs, and the advanced forms of organic stricture. Here may be seen the rapid conversion of the whole area, which comes in contact with urine so effused, into a mortifying mass. This was so well illustrated in a case of an extremely rare nature which recently came under my notice that I will give you the particulars of it.

It was that of a boy, æt. 14, whom I saw in consultation a few weeks ago. His history was as follows: He had suffered for years from an irritable bladder, and pain following urination, but nothing appears to have been done for him, his parents not wishing an examination to be made. Four days before I saw him, when playing with some friends in the garden, he fell heavily on his perineum astride over some palings, and then on to his side. This was followed by swelling of the supra-pubic region, extending to the penis and scrotum. There was no discharge of blood at the time of the accident from the urethra, nor was retention of urine complete. When I saw him four days afterward the supra-pubic region and the skin of the penis were gangrenous, and the scrotum distended. The perineum was flat and not œdematous as is usually seen when rupture of the deep urethra from injury occurs. I could not pass a catheter simply for the reason that the glans penis was entirely concealed by a large œdematous and sloughing prepuce. As it was quite clear that extravasation of urine had occurred under somewhat unusual circumstances, the patient was put under chloroform. I then proceeded to deal with the different points where relief was obviously required to let urine and disorganized tissue escape, this consisted in making the incision as for supra-pubic cystotomy, incising on either side the raphé the distended scrotum, and splitting up the sloughing prepuce along the dorsum of the penis where the tension was greatest. This enabled me to discover the glans penis, and to introduce a silver catheter into the bladder. This at once led to the detection of a stone which seemed to be held within the prostatic urethra. Though not provided with instruments for lithotomy, I thought the stone should be removed at once. I therefore cut down in the median line on the silver catheter, and opened the urethra in the membranous portion. This enabled me to feel the stone with my index finger, though as soon as I touched it, it fell back into the

bladder; however, with an ordinary pair of dressing forceps, and my finger in the rectum, I succeeded in extracting a pointed stone of a torpedo shape, weighing nearly three drachms. It was composed of light-colored uric acid with a coating of phosphates, and is represented in the figure (Fig. 3).

From the examination I made of the parts I have not the slightest doubt the stone penetrated the bladder immediately behind and below the pubes at a point corresponding with what is commonly called the neck of the bladder. This permitted urine to be effused into the space known as the porta vesica of Retzius, and occasioned all the disastrous effects I have mentioned. The free drainage which the lithotomy wound provided was an important factor in the progress of the case. Though there was considerable sloughing of the prepuce and skin of the penis, scrotum, and supra-pubic region,

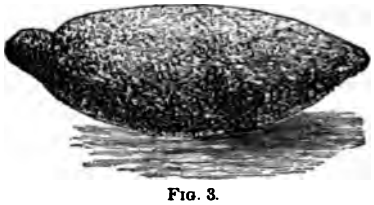

FIG. 3.

the patient made a rapid recovery. The case is unique, so far as my experience goes, for though instances have come under my notice where calculi have made their way through the perineum by a slow process of inflammation and suppuration, I am not aware of an instance where the bladder has been suddenly ruptured by a stone it contained in the way I have described.

Cases, such as these, however, may not only be used for illustrating the acutely destructive properties of urine, but as indicating how completely Nature provides for all the contingencies of life. What could only happen to a man who was unfortunate enough to rupture his urethra when removed from surgical aid unless the urine contained within itself a property for effecting its own escape? I am now seeing a patient for a perineal fistula whose life was undoubtedly saved in this way. He was travelling in the bush last year in South Africa, and had the misfortune to rupture his urethra by his horse falling when he was hundreds of miles away from proper

medical assistance. Acute suppuration in the perineum and sloughing of the scrotum followed, but in spite of this he recovered. He is now under treatment for three fistulæ through which the whole of the urine was discharged for many months during a process of convalescence under most unfavorable conditions. Still, the acute sloughing which followed the accident, and for which the urine was responsible, undoubtedly saved the life of the patient.

But though we have evidence in cases such as these of the destruction certain elements of the urine are capable of bringing about, we have further proof, if this were required, in instances where the urine by reason of its altered character is incapable of undergoing that chemical change which is necessary for acute tissue destruction.

I recorded a case ("Lectures on Urinary Disorders," third edition, p. 46) which came under my notice some years ago, where a middle-aged man who was being attended for Bright's disease suddenly developed what was supposed to be an œdema of the scrotum. The case proved to be one of urethral stricture, complicating Bright's disease, and causing acute scrotal extravasation of urine. But though the swelling had been in existence for twenty-four hours before I saw him, it seemed curious that no signs of inflammation and gangrene appeared imminent. However, as the tension was considerable, I incised the parts involved in the extravasation. As the fluid escaped from the incisions I noticed that it had not the ammoniacal odor which is always so perceptible in such instances. I was somewhat puzzled for an explanation how it was that extravasated urine failed to cause signs of gangrene. I subsequently collected some of the urine as it trickled through the wounds, and compared it with some drawn off from the bladder by the catheter. I found them identical, and chemical analysis proved that in both there was an almost complete absence of urea, the specific gravity of the urine being as low as 1004. This, then, to my mind solved the mystery, and explained that as there was no urea to decompose there was no source for the production of the ammonia by which the destruction of tissues in connection with extravasated normal urine is effected. By the absence of urea the urine was rendered chemically harmless to the tissues with which it came in contact.

Passing, however, from instances of acute tissue poisoning,

I shall have no difficulty in showing you that the same fluid is capable of being placed under circumstances where certain general septic effects may in various degrees be developed. If any one who is interested in this subject will take the trouble to turn to the records of internal urethrotomy as practised only a few years ago they will find in the rigors, fever, and occasional deaths that followed this operation, the most unmistakable evidence that experiment is capable of affording, of some forms of urine poisoning which seemed to be associated with certain conditions under which the urine was placed by the nature of the operation that was practised. I was so much impressed with this at the time that it led me to alter my practice materially in reference to an operation which, on other grounds, had much to commend it.

In 1885 I published ("Brit. Med. Journ.," July 18th, 1885) a series of cases, where in some extremely bad cases of stricture unfitted for any other kind of treatment, I performed internal urethrotomy, and at the same time provided for thorough urine drainage by a puncture in the perineum, through which a tube was passed. Time will not permit me to enter into this subject as fully as I could wish, but putting aside collateral evidence and advantages connected with the proceeding advanced, I established the facts (1) that the rigors and fever following operations on the urethra were entirely septic, and (2) that they could be avoided by providing for more perfect urine drainage. But though it may not be possible or expedient to construct all wounds on such principles as to secure healing without the risk of decomposition and absorption of some of the element of the process, which is the essence of antiseptic surgery, the practice of Lister has demonstrated how much may be artificially done by the employment of antiseptics to secure this end. If the urine, as I have demonstrated, can be placed relatively to a wound under conditions such as to make its absorption poisonous to the system at large, it has, on the other hand been proved possible to so influence it artificially as to render such a contingency extremely improbable.

And this stage of the argument leads me to lay stress on what has been spoken of as the sterilization of the urine by artificial expedients. Modern therapeutics have undoubtedly shown that some drugs can so influence normal urine as to

cause it to behave very differently from what it would otherwise do when brought into contact with certain kinds of wounds. The power of quinine in connection with operations on the urinary organs has long been recognized, and there can be but little doubt that this is directly associated with the fact that it is so largely eliminated by the urine. Still more striking is the testimony of Dr. Palmer, of Louisville, U. S. A., who found that he could so sterilize the urine by the administration of boracic acid in ten-grain doses as to prevent the occurrence of urethral fever after such operations on the urethra as internal urethrotomy. My own experience in connection with the latter opération corroborates this, for after the use of antiseptics, principally through the medium of the urine, I have enjoyed an immunity from septic fever attacks after operations on the urinary passages which compares most favorably with what was previously observed. Nor am I disposed to think that the power of sterilizing the urine so as to render it innocuous when placed under conditions where otherwise it would be liable to generate septic influences is limited to quinine and boracic acid. Further investigations will no doubt show that many other principles are capable of exercising somewhat similar powers. For instance I have frequently been struck with the action of hyposulphite of soda in half-drachm doses in some purulent affections of the urinary organs, and I have but little doubt that this is due to the direct influence of the drug as a bactericide in the way that I have endeavored to lay stress upon.

Passing, however, from the acuter forms of local and general urine poisoning, I will proceed to notice others belonging to the same category. It is now some years ago since Sir Andrew Clark drew attention to certain febrile symptoms occasionally following catheterism, to which the term catheter fever has been applied. In the general discussion which followed the publication of these observations, it appeared to me that insufficient prominence was given to the fact that residual urine is an absolute necessity to some bladders, and that if an attempt is made to do without it something worse is provided—that is to say, septic urine is substituted for aseptic. In a number of observations I made in reference to this point, I found that in certain cases of enlarged prostate, where the bladder was not generally atonic, the removal of acid residual

urine was followed by the rapid conversion of subsequent excretions into a more or less ammoniacal compound loaded with bacteria. It was under such circumstances that catheter fever was seen, and I cannot find any evidence that it has ever been met with where the urine was proved to be normal.

In the course of the inquiries to which I have just referred, I found from repeated examinations that it was not difficult to explain how urine thus became acutely septic. Where a bladder has been accustomed, we will say, to contain three or four ounces of urine, the sudden withdrawal of the latter establishes a condition of flaccidity of the vesical walls which is favorable to the admission of air either by the instrument or the urethra; in the next place, there is an excessive exudation of mucus from the prostate and adjacent parts; and lastly, sanguineous pouring out takes place from the vesical vessels which are thus suddenly deprived of their support. In this way material for decomposition is amply provided. So satisfied am I that the physical condition of the suddenly and completely emptied bladder has everything to do with the setting up of so-called catheter fever—a term which must be regarded as merely expressive of what other cavities and spaces in the body are capable of producing whenever their contents are in any way analogous—that I consider very special precautions should be taken in the first instance, whenever residual urine has to be artificially and systematically removed, with the view of preventing the aseptic conditions to which I have referred being provided. What surgeon does not recognize the necessity of doing so where a chest or a psoas abscess has to be tapped with the view of averting what might, with equal force, be called a trocar fever? Where the urine is acid to commence with, it should be removed by instalments; and where alkaline or unhealthy, it should be replaced by some antiseptic fluid, the quantity of which may from time to time be reduced. There is no better antiseptic for the bladder than healthy urine; there is no more dangerous one than when the latter is made to undergo active decomposition.

In failing to recognize a septic cause for the fever which occasionally accompanies catheterism, and referring it to some occult morbid condition of the nervous system, I cannot help observing that the same kind of explanation was advanced up to a few years ago as explaining the rigors and fever follow-

ing the use of instruments for urethral stricture, until I demonstrated by a series of operations (Lettsomian Lectures, 1888) that these phenomena were due to the absorption of some products of the urine, probably of the nature of alkaloids. On this being recognized and provided against, as it now is in most operations on the urethra, the occurrence of such complications, often attended with considerable risk, has been largely diminished, if not entirely prevented, in the practice of most surgeons.

Having briefly reminded you of certain local and general poisonous effects that normal urine is capable of producing, and how these effects may to a large extent be prevented or provided against, I will proceed to notice certain drugs which seem to me to exercise, probably in the mode in which they are eliminated, a beneficial effect on some of the disorders connected with the urinary apparatus. In the present day, when we are overwhelmed with the number of new drugs coming under notice, one is rather disposed to speak with reservation on such a subject. Still, on the other hand, there can be no doubt that the field of therapeutics is steadily extending, and that valuable additions are from time to time being made. Early in 1886 my attention was first called to the use of pichi (Fabiana imbricata) in connection with some diseases of the urinary tract. The case in point was that of a gentleman who had long suffered from attacks of renal colic and hæmaturia. On several occasions he had passed uric acid stones of considerable size after much pain, and once I had to crush a calculus for him which was too large to escape along the urethra. While travelling in Bolivia that year he was seized with a similar attack, and was treated entirely by means of an infusion of pichi, which he seems to have drunk *ad libitum*. He got through this attack very much better than previous ones—a fact which he attributed to the new medicine. He brought me home some specimens of the raw material such as you see on the table.

For the last four years I have been using this drug in the form of an infusion and fluid extract, in drachm doses of the latter, pretty extensively both in private and hospital practice, with, I believe, considerable benefit. I have found it useful in many instances of the following: 1. In renal colic and the passing of calculi through the kidneys and along the ure-

ters, attended with hæmaturia: though not exercising any solvent power it seems by its action on the tissues in some way to favor the escape of the stone, and thus to suppress the bleeding. 2. In the hemorrhage which frequently accompanies cancer of the bladder. In the case of a medical man who was recently under my observation it certainly gave more relief than anything else that was tried, as I have also noted in other instances. Lastly, the sedative action of the drug on the mucous membrane of the bladder has proved beneficial in many instances of irritability connected with a large prostate. After the bladder has been properly cleansed by irrigation and disinfected, it has been frequently found that the calls to urinate were far less urgent when the pichi was being used.

Acting somewhat similarly though less astringent in its properties, and therefore of less value when there is hemorrhage, I have found an extract prepared from the berries of fruit of the saw palmetto (Serenoa serrulata) very serviceable. Writing in reference to his own case, a surgeon in America says: "I do not know whether you have used the saw palmetto in cases of prostate trouble. I have used it several times with apparent advantage." It is stated to be a plant of the palm tribe, which is indigenous to the coast of Florida. It appears in the first instance to have been used medicinally as a demulcent in connection with irritative disorders of the respiratory mucous membrane. It is also stated to possess fat producing properties in the case of animals that feed upon its fruit. Messrs. Bell and Co., of Oxford Street, have prepared me a fluid extract from the berries, which, in doses of half a drachm to a drachm in water, has proved of service in cases of irritable bladder. It seems to act something like pareira, and is a good substitute for it.

Of the chemical products which I have tried in this class of disorders, I would mention saccharin in half-grain doses. Attention was first drawn to it by Dr. Little ("Dublin Journal," June, 1888) as being useful in preventing ammoniacal change in urine in cases of cystitis. Where the mucous membrane of the bladder throws off large quantities of mucus and the urine undergoes rapid ammoniacal decomposition, I have on several occasions noted that the latter becomes healthy and acid under the use of saccharin. On discontinuing the drug I have also observed that the urine will speedily return to its

original condition. Hence it may be found useful in readily providing against conditions which cannot be radically altered. Dr. Thomas Stephenson and Dr. Woolridge ("Pharmaceutical Journal," December 1st, 1868) have shown that saccharin may be taken for a considerable period without interfering with the digestive or other functions of the body.

Before closing the chapter I will show you a preparation which was first made for me some years ago by Clay and Abraham, of Liverpool, which I have now used rather extensively. It is described as the borocitrate of magnesia. My attention was first called to it by a paper by Dr. Kochler, of Kosten ("Berlin klin. Wochen.," November 3d, 1879), who advocated its employment in cases of uric acid calculi and gravel. It is prepared by dissolving a natural borate of magnesia which is found at Strassfurt in citric acid. It forms a white powder with a sourish taste, and is given in teaspoonful doses in a tumbler of warm water two or three times a day. I have tried it in several cases of impacted renal calculi, which have come to this hospital with the view of having the stone removed by operation. Here are two specimens of stone which have been passed by two patients within the last few days who had been taking the boracite for some weeks previously for attacks of renal colic and hemorrhage. One of the stones, you will see, presents a slightly worm-eaten appearance as if it had been exposed to some solvent action by which its loosening and ultimate escape had been facilitated. I do not pretend to offer any reasons based on the chemistry of the subject for what I am showing you, all I can say is that I have frequently known the discharge of these bodies, whose presence had previously been suspected, to take place after the use of the salt. It may be all it does is to secure that the individual shall take at stated times more fluid than perhaps he would otherwise do; an important point upon which Sir William Roberts has laid stress. I am, however, disposed to think, from what I have seen, that it does more than thus induce a person to flush his kidneys with a bland fluid by no means disagreeable to take, but that it is capable of modifying or altering the crystalline form in which uric acid is discharged and of exercising a solvent power on some kinds of urate stones.

CHAPTER IV.

HÆMATURIA: ITS SIGNIFICANCE AND SURGICAL TREATMENT.

I HAD intended to bring under your notice to-day some points connected with the selection of catheters and other instruments used in the treatment of urinary diseases; I find, however, I have already said a good deal upon this subject, and that what remains to be added may be incidentally introduced with other material. I, therefore, propose speaking to you about hæmaturia in more special reference to its surgical significance. In order that I might provide myself with a text, and so approach a very wide and important subject with some degree of system and concentration, and at the same time with a direct bearing upon practice, I have carefully gone over my note-books containing the records of my private practice, and selected the last hundred cases of true hæmaturia that have come under my observation. Apart from my notes most of these cases, being comparatively recent, are within my recollection, and in regard to a considerable proportion I can speak from a more continuous knowledge of them than I could do of a similar number of hospital or public patients. For it must be noted that cases of hæmaturia often run over very considerable periods of time without seriously injuring or inconveniencing the individuals who suffer in this way. I have taken the cases just in the order they have come under my notice, only rejecting those where the bleeding from the urinary passages occurred under circumstances which cannot be said to have anything but a very limited significance. I refer to such cases as those where blood is mixed with the urine as a consequence of the use of catheters and other instruments, and in connection with gonorrhœa, and the use, or rather abuse of injections; these I have excluded from my list.

In the hundred case I have thus taken I will put in the

order of their frequency the causes which in my belief have produced this symptom or are responsible directly for its continuance:

Kidney stones,	30
The hypertrophied prostate of elderly males,	20
Bladder stones,	14
Tumors of bladder and prostate—mostly malignant,	13
Urinary tuberculosis,	6
Stricture of the urethra,	5
Cystitis not due to a senile prostate,	3
The passing of crystals from the kidney downward,	3
Traumatisms or their effects,	2
Filaria sanguinis hominis,	1
Of very doubtful origin,	3
	100

I am not at all sure whether, in this country at all events, the order of frequency which I believe occurred in my practice does not represent tolerably accurately the general experience in reference to this one symptom. I say this country, because local conditions may have a largely determining influence. For instance, if statistics on a large scale were taken in certain parts of the East, as in Egypt, it would be found that the hæmaturia due to a parasite largely predominates. In certain districts of England as well as in the practice of some medical men, the hæmaturia due to stone and gravel might be even much in excess of that which I have put it at, but taken as a whole the proportions I have given will, I think, be found fairly representative.

Hæmaturia may be regarded as a tolerably constant symptom of stone in the kidney, and is, I believe, more to be relied on for diagnosis than any other. It is not, however, invariably present. In the case of a man from whom I removed two stones from the kidney a few months ago with success, this symptom was absent, the indication for the operation being the acute paroxysms of lumbar and testicular pain from which he suffered. The persistence of hæmaturia associated with symptoms of renal colic is sufficient to warrant the exploration of the suspected organ by an incision in the loins. I have practised the lumbar incision as elsewhere described ("Notes

on the Surgery of the Kidney," "Liverpool Medico-Chirurgical Journal," January, 1889) and have every reason to be satisfied with it.

In the thirty cases of hæmaturia due to impacted renal stone which I have tabulated, there were several where the escape of the calculus followed the use of boracite as described in the previous lecture, and with this the cessation of the hemorrhage.

It may not be out of place to point out here that the descent of a calculus from the kidney may be favored sometimes by the distention of the bladder with water and its regurgitation along the ureters. I have endeavored to show in a paper on the subject ("The Lancet," March 10th, 1888) how this may be done, and how very little it sometimes takes to favor the dislodgment of a stone from the kidney which may have been a source of hemorrhage and pain for some time.

Stone in the bladder was attended with bleeding in fourteen instances. Hæmaturia is not as a rule a constant symptom of this affection, though the circumstances under which it occurs are generally very significant. When you hear of a person with an irritable bladder who cannot, for instance, take horse exercise, ride on an omnibus, or walk along a rough road without seeing blood in his urine, you may take it as a good hint that he may have a stone in the bladder. At all events, in the absence of other indications it is generally worth acting upon and suggesting that a sound should be passed, and the bladder explored. Then an acute attack of hæmaturia, followed by irritability of the bladder, may sometimes indicate that though a stone has passed down from the kidney it has not escaped by the urethra. This happened in two instances out of the fourteen I have tabulated. In both cases a single crush with the lithotrite effected the immediate discharge of the fragments with no further inconvenience to the patient.

If, after patients have suffered from undoubted signs of renal colic, and no stone is known to have been passed, they could be induced to have the bladder explored, and, if necessary, a lithotrite introduced, the mortality after stone operations would be practically *nil*.

In three instances out of my hundred, the passing of crystals chiefly uric acid, was apparently responsible for the ap-

pearance of blood in the urine. In none of these cases was the amount of blood considerable. Some persons seem never to be well unless they are passing large quantities of uric acid, and everything which tends to check the excretion appears to add to their discomfort. I believe the hemorrhage that attends these discharges of uric acid is connected with the precise nature of the crystalline form, as a change in the shape of the crystal is often followed by a cessation of this symptom. It is under these circumstances, and with this object that the waters of the Vosges, such as Contrexeville and Vittel often prove of so much service. The youngest patient of the three coming under this category was a female child, a few months old, whose urine contained a large number of uric crystals which seemed to be the cause of the bleeding. The patient was fed on equal quantities of milk, barley, and Contrexeville water, under which the symptoms disappeared. *Apropos* of hæmaturia caused by crystals, I would refer to a correspondence ("The Lancet," July 5th, 1890) relating to the presence of blood in the urine after eating cooked rhubarb. I have known this happen on several occasions, especially where the drinking water is hard, as pointed out by Dr. O'Neill, crystals of oxalate of lime being found in the urine in abundance. I have also seen the most profuse hæmaturia occur after an excessive indulgence in asparagus.

Senile enlargement of the prostate appeared to be responsible for twenty cases of hæmaturia out of the number. In the majority of instances the amount of bleeding was not large, but it would recur from time to time on very slight causes, such as cold and fatigue. There are a good many persons with large prostates who get temporary attacks of bleeding much on the same principle as others do who suffer from piles. Dr. Frank reminded me the other day that the term "prostatic pile" was a condition recognized by some German writers on this subject. I fully appreciate the force of the expression. When the bladder is capable of emptying itself tolerably well this symptom is merely a temporary one and usually disappears with some restrictions in diet and a little active purgation. There is, however, one condition of the senile bladder which adds considerably to the trouble connected with this kind of bleeding. I refer to those instances where it occurs with a large prostate and an atonic, or almost com-

pletely atonic, bladder. The great safeguard against prostatic hemorrhage is the power of the bladder to exercise pressure. In two instances not only had I to empty the bladder of blood, but to keep it empty by pressure upon it, and the retention of a catheter until the tendency to bleed had ceased, just as is done with the flaccid uterus. In both the instances I refer to this was successfully accomplished, and the patients recovered, though the loss of blood was considerable. It is not the least use depending upon hæmostatics in cases such as these, the mechanical reason why the bleeding will not cease must be recognized and acted upon, or the patients will flood to death with their bladders distended with blood up to the umbilicus, as I have seen.

For the purpose of emptying the bladder under such circumstances there is nothing like one of the catheters and aspirators which are employed in evacuating the fragments of stone after lithotrity. Unless this is effectually done, there is very little chance of restraining the hemorrhage.

Malignant tumors of the bladder or the prostate accounted for thirteen cases of hæmaturia. If the disease is in the prostate, you can generally make it out with the finger in the rectum; if this is not the case, then you may have this very significant fact, that though from its nature the blood evidently comes from the interior of the bladder, you have no senile prostate to account for it; the patient may be, and often is, considerably under the hypertrophic age. Then there is another helpful point in connection with the diagnosis of malignant tumors of the bladder, they are as a rule more comfortable when bleeding moderately than when the urine is absolutely clear. This is a point I have often noticed in cases which have been verified, either by operation or post-mortem examination. It is also curious to notice how slow some malignant growths of the bladder and prostate proceed: there may be repeated attacks of hemorrhage, but I have known such cases as epithelioma of the bladder go on for four and six years, and really occasion but little inconvenience until the bleeding becomes profuse and unrestrainable, and the question will then naturally arise, What is to be done when the hemorrhage from such a growth becomes excessive? My belief is that when this stage arrives, in the majority of cases the best thing to be done is to open the bladder above the

pubes. I can hardly recall an instance when, by this expedient, a patient did not obtain a temporary respite from bleeding, and the consequences that follow it. Even if the wound never closes again the patient can be kept in a far greater state of comfort than when he only has his urethra to depend upon. In the female the ready way in which the growth can be got at and removed is a strong reason for early exploration, and, if necessary, removal.

Hæmaturia is almost as constant an indication that tubercle has invaded the kidneys or ureters as hæmoptysis signifies that the lungs are tubercular. Urinary tuberculosis may be either ascending or descending. It is always a good plan in tubercular subjects or in persons who are suffering from ill-defined slight attacks of hæmaturia, and possessing tubercular histories, not to neglect to make a careful examination of the testes, the prostate and the vesiculæ seminales, with the finger. The detection of tubercular deposit in any of these positions, under these circumstances, will often throw the necessary light upon the hæmaturia. The shotty feel of the prostate when impregnated with the early form of this deposit is important to know how to recognize. In the breaking-down stages of urinary tubercle, the presence of pus as well as blood, not to say anything of the bacillus, adds considerably to the ease of making a diagnosis.

Stricture of the urethra is accredited as the cause of five cases of hæmaturia. It is not as a rule the stricture that bleeds, but the bladder from the atony that ensues by reason of the viscus being very imperfectly emptied. In two instances the strictures were extremely tight, and it seemed impossible how the cause of the bleeding could have been overlooked. In every instance where the stricture had been sufficiently dilated and the bladder had regained its tone, the blood disappeared from the urine.

It is curious to notice how some persons with really tight strictures, by the use of greater expulsion force mitigate considerably the inconvenience the contraction would otherwise cause. It is not always easy to remember this in practice. There is a patient attending the out-patient department to whose symptoms I have often directed attention. He came here complaining of loss of power over the bladder and lower extremities, from the loins downward. There was diminished

sensation and the reflexes were unnatural, and it was clear from his gait that he was suffering from an early stage of paraplegia. On examining his urethra I found that he had a moderately tight stricture in the membranous portion, and as there was no other cause for the condition of his limbs I regarded it as one of reflected paralysis, and commenced to dilate his stricture. Under this treatment, it was observed that movement and sensation in the affected parts gradually returned and in three months all symptoms of paralysis had disappeared, the patient being able to walk several miles without fatigue. I have met with two or three instances of this kind. I am induced to refer to them here as illustrating how a stricture may not only escape notice, but produce remote symptoms which, at first sight, would hardly suggest such a cause. In like manner a persistent hæmaturia may be dependent upon a contraction in the urethra and continue until the latter is removed.

Wounds involving the kidney may in some remote way or other cause blood to find its way into the urine and become mixed with it. Let me mention two examples: In May, 1888, I saw a patient in consultation with Dr. Glynn who was suffering from purulent urine. Six weeks before I saw him he had a very free attack of hæmaturia which lasted for some days. He had no symptoms of renal colic, but complained of a dull aching pain in the region of the left kidney. His history was as follows: Five months previously when at sea he was shot by his steward in two places, one ball passing through his thigh, and the other entering his left side two inches in front of the posterior superior spinous process of the ilium. He was leaning over his assailant who was on the ground at the time the bullets were fired. He was confinedi to bed for some time and has since suffered from urinary irritation and purulent urine. There appeared to be an increased area of dulness below the left kidney, and the part was sensitive to the touch. The bladder was sounded, but I could detect nothing abnormal. I have no doubt the bullet is imbedded in the left kidney, from which place I proposeed to remove it, but as the man was returning home to America, and was in fairly good health, he declined to submit to any operation at present. The other case of traumatic hæmaturia followed the escape of a pin by the urethra which had been

swallowed by a gentleman, 56 years of age, four months before it was voided.

Three cases of hæmaturia were associated with cystitis which had occurred in males independent of a large prostate or gonorrhœa. In one the cystitis followed an injury to the abdomen where probably the bleeding was due to some slight laceration. In the other two instances it seemed to be connected with the violence of the inflammation, one of the patients being an extremely gouty subject with highly acid urine.

My list contains one illustration of bleeding due to the filaria sanguinis hominis. The presence of this parasite in the urinary system explains cases which were formerly described under the name of chylous urine. In referring to this parasite, Sir William Roberts ("On Urinary and Renal Diseases." 4th edition) says: "Its local effects are supposed to depend on the formation of aggregations of filaria which block up the capillaries and cause by their active movements irritation and rupture of the blood channels and lymphatics, and thus lead to the appearance of chyle and blood in the urine." In the case to which I am now referring, the urine was at one time quite chylous in appearance, while at others it was deeply colored with blood and contained large clots. The presence of the parasite was in this instance detected both in the blood and urine by Sir William Roberts and Dr. Stephen Mackenzie, who were kind enough to see the patient. The administration of iodide of potassium in 20-grain doses, as first suggested by Dr. Harley, seemed to be followed by good results.

The list closes with three cases where the origin of the bleeding seemed so obscure that I did not even like to venture an opinion, which could not be supported either by reason or experience, as to its probable origin. In many of the instances where there was a doubt as to the nature of the bleeding and in others where further confirmation seemed desirable, the electric cystoscope was used. As an adjunct to other means for diagnosis I can testify to the value of this instrument. On several occasions I have gladly availed myself of the kind assistance of my colleague, Mr. Hurry Fenwick, whose recent work on this subject has contributed so much toward establishing the utility of electricity as an illuminant for surgical purposes.

CHAPTER V.

THE EARLY DETECTION AND TREATMENT OF STONE IN THE BLADDER.

THE risk attending the removal of a stone from the bladder may be roughly estimated by the size the stone has been allowed to attain. Hence I have selected as a useful subject for our consideration to-day certain points connected with the early diagnosis and treatment of this affection.

I need hardly remind you that when a stone assumes such dimensions, or is of a shape where it cannot be expelled along the urethra by the natural efforts of the bladder, its removal must be effected either by a crushing or a cutting operation. Up to within a comparatively recent date the various operations included under the term lithotomy were almost universally employed, the crushing operation being confined to the least dangerous forms of the disorder, and in a sense restricted to the practice of a comparatively few. During recent years all this has been greatly changed, lithotrity is now the rule at all events in adults, the cutting operation being reserved for exceptional conditions either of the stone or the parts involved. When we consider the small risk that now attends the operation of lithotrity it is impossible not to feel in every case where a stone has to be removed from the bladder by the use of the knife, that there was a time in its history when such a proceeding would have been quite unnecessary. In the present day the rejection of lithotrity in a given case implies one, at least, of two things, (1) either that the stone has been allowed to grow too big to admit of its removal in this way, or that (2) by its long continued presence the stone has so altered the structural arrangement of the parts in its immediate vicinity as to render the ultimate success of the crushing operation highly improbable.

Before proceeding to notice some mechanical details connected with the detection of stone, I would remind you for

reasons that will be obvious that the primary formation of stone in adults and children is very different. In the former I believe, as a rule, vesical stones are extensions on appreciable nuclei which have descended from the kidneys, while in the latter they are from the commencement aggregations formed in the bladder. This is an important distinction which often works out in the following way. In children it is almost impossible to form an approximate idea as to when a stone began to form in the bladder, whereas in adults the process can often be distinctly connected with a marked attack of renal colic, hæmaturia, or nephralgia. This is especially noticeable in those cases where urates or oxalates form the nucleus or centre of the stone, as when the calculus is phosphatic throughout, it not infrequently happens that there is present some special reason why the bladder should be entirely responsible. In the case of many stones I have thus not only been able to fix the probable date when they entered the bladder, but to form an estimate of the rate at which they have grown. Hence, as I have said in a previous lecture, persons who pass stones from the kidneys would do well if there is any doubt, to take steps for ascertaining that the stone has left the bladder and is not remaining there to grow and to make its subsequent removal a proceeding in which an element of risk is introduced.

If I were asked to briefly enumerate the indications for sounding the adult male bladder, I should put them down in the following order: for continuing irritability of the bladder unexplainable or insufficiently so, by the presence of a large prostate: for the recurrence of blood in the urine, particularly after brisk or jolting exercise, and for the frequent intervention of bladder spasm, either with or without the habitual use of the catheter, where the prostate is known to be enlarged. These conditions will be found to indicate more frequently than any other the presence of a stone in the bladder. Pain or irritation felt at the end of the penis is of more value as a symptom of stone in children than in adults, as with the latter a large prostate rendered sensitive by the condition of the urine passing over it is quite sufficient to account for this symptom. For instance, nervous persons in the habit of passing highly phosphatic urine usually have tender prostates, and often complain of pain at the end of the penis. I have known

such individuals to be frequently sounded for stone or tumor on that account.

For sounding purposes nearly every surgeon has his favorite implement which generally bears his own name. An inspection of a variety of sounds would seem to indicate that the hand has more to do with the process than the exact shape and make of the instrument. Sounds should not be so large as to fit the urethra too tightly, otherwise much of the delicacy of the touch will be lost. Where the prostate is very large the surgeon should be provided with a sound two or three inches longer than those usually made, otherwise he may fail to easily reach all parts of the bladder, unless the penis is inconveniently telescoped. When the bladder is much distorted in shape you can feel a stone with a soft bougie when a steel sound cannot be made, without force, to touch it. For such a purpose I have sometimes found a flexible instrument with a metal tip extremely useful. As Dr. Freyer has pointed out, the aspirator and catheter employed for the removal of fragments of stone after lithotrity make a capital sound by causing stones, often of small size, which might otherwise escape notice to rattle against the eye of the instrument. I have employed this device for the removal of certain kinds of foreign bodies from the bladder, and thus avoided resorting to less delicate forms of searching and extracting instruments. Here is a fine pig's bristle, slightly coated with phosphates, which was detected and removed by the apparatus just referred to. In this instance the patient had first passed up into his bladder a piece of bacon rind with the view, I presume, of lubricating the urethra, the bristle being subsequently introduced. Symptoms of bladder irritation coming on, I sounded with an evacuating catheter and rubber syringe such as I am now showing you, with the result mentioned. The case is fully reported elsewhere ("The Lancet," October 29th, 1887) with remarks on this subject.

It must not be forgotten that, however delicate your touch and however well devised your sounds may be, there are some kinds of stone which you do not feel until you have them in the jaws of the lithotrite. This has happened to me twice recently; so far as the sounding went, and with a strong suspicion in my mind that a stone was present in each instance, I could not detect one until I had passed a lithotrite, and had

actually got the calculus within the grasp of the instrument. Here is the specimen from one of these cases. Some phosphatic stones are covered over with a thick slimy sort of tenacious mucus which effectually muffles the sensation and sound that contact between a steel body and a stone would otherwise give. Large stones which are located behind and above the pubes, are sometimes missed by the curved sound passing directly under them. When you are sounding, a lithotrite should always be at hand, not merely for measuring the stone when detected, but for gently feeling about with. As a rule it is better to sound a person under an anæsthetic; in this way pain is entirely avoided, and the examination is rendered far more searching and complete.

Apart, however, from the question of size, it is most important that a stone should be detected before it leads to certain structural changes in the bladder itself. Five years ago ("Annals of Surgery," June, 1885) I described some forms of calculi in the bladder under the name of fixed or stationary stones, implying that without being encysted they occupied certain positions, most commonly above the enlarged prostate, from which they seldom moved except by accident. In connection with this point one cannot go over a fairly long list of lithotrity cases without here and there recognizing one where bladder symptoms only became urgent and continuous after the stone had been completely and properly crushed and evacuated. Let me illustrate what I mean. A patient about sixty years of age, consulted me some years ago for occasional hæmaturia. Behind an hypertrophied prostate I found a large urate stone which I subsequently removed by lithotrity. After some weeks of complete relief, he again began to complain of irritability of the bladder, and in addition the discharge of ammoniacal urine indicating that which he had never previously suffered from, namely, chronic cystitis. This continued for some time, when on sounding him again I found the place of the original stone occupied by a considerable mass of triple phosphates which I also removed by crushing. The same thing occurred about a year afterward. The first stone that formed no doubt represented a constitutional tendency, while the latter ones seemed to me to be connected with certain changes in the shape and structure of the bladder wall, which had been brought about by the long-continued presence of the

one that had preceded them. The effects produced on the bladder itself by the retention of a stone for some considerable time with special reference to the recurrence of calculus, is a subject worthy of careful consideration, as insufficient attention has hitherto been paid to it.

That the earlier detection of stone which now prevails, coupled with Bigelow's method of operating, has contributed largely to the reduced mortality connected with the affection, there can I think be no doubt. Any one who is at all acquainted with the subject will recognize as a fact that the risks attendant upon the retention of a small stone in the bladder, are really far greater than those which its removal by lithotrity now entail. For, apart from its influence on the structure of the bladder and the irritation it creates, the presence of a calculus may not only prove to be a constant source of bleeding, but may actually lead to the rupture of the bladder, as I have shown in a previous lecture.

Further, as bearing upon the importance of dealing with stones while they are within the reach of lithotrity as now practised, we may point to our greatly lessened period of convalescence as compared with that which prevailed before Bigelow's discovery. Looking back at my notes of cases which occurred before and after this period, and comparing them stone for stone, the period of convalescence has diminished by less than one-half. It is not at all uncommon to see stones which formerly would have occupied two or three operations, or sittings as they were called, extending at intervals over a month or so, now disposed of at one crushing, recovery taking place within a week or even less. This not only means a considerable diminution in the amount of direct risk which repeated crushings necessarily entail, but in those connected with whatever tends to protract a convalescence. I do not think I am wrong in stating that Bigelow's method has reduced the period of recovery after lithotrity, taking all sizes of stone together, by something like one-half the time. No better illustration of this point could be taken than the last case I operated upon at this hospital, at which several of you were present. The patient, a male, 50 years of age, was operated upon on July 2d, and was discharged well on the sixth day afterward. The stone was a urate one coated with phosphates, and had a diameter of an inch and a quarter. Though the

operation occupied nearly half an hour the water in the wash-bottle used for removing the fragments, was noticed to be hardly discolored with blood, and the day following the operation the urine was perfectly clear and normal in appearance. There are a few details I would lay stress upon which may be of service to those who are commencing to practice lithotrity.

1. To suspend all manipulations with the sound or lithotrite, or in washing out the fragments, when the bladder is on the move. Patients even when profoundly under an anæsthetic with the reflexes in abeyance, will sometimes commence to force and squeeze with their bladders in a most remarkable manner. The pressure of this may be roughly measured by the distance fluid is projected from the catheter even by some bladders which were supposed to be atonied or paralyzed. All movements on the part of the operator should be at once suspended till this is over. I have known three instances at least where rupture of the bladder occurred from disregard of this precaution, two where the lithotrite was being used, and one where the wash-bottle was in action. It is very easy to rupture a bladder when it is on the strain, whereas such an accident is most unlikely to happen where the organ is quiescent.

2. Conduct all your manipulations so as not, if possible, to cause bleeding. Some operators will hardly discolor the water in the wash-bottle even where the manipulations are prolonged.

3. Before the operation is completed remove all clots from the bladder and wash out with warm water until there is evidence that any bleeding which may have been caused by the manipulations has practically ceased.

4. Ascertain before the patient recovers consciousness what kind and size of catheter passes easiest. On the use of this instrument in the after-management of the patient much depends. If urine mixed with blood is retained and allowed to undergo putrefaction some degree of septic fever is sure to occur. As a rule, after each time the catheter is used two or three ounces of warm boracic lotion in the proportion of a drachm to a pint should be thrown into the bladder by means of a rubber bottle and allowed to escape. This should be continued until the urine is voided, either with or without the use of the catheter, of acid reaction and free from blood staining.

Passing from by far the larger class of cases which are now treated by lithotrity, and from urging the importance of endeavoring, by an early diagnosis, to bring all cases within this category, I will proceed to notice those instances where lithotrity seems to be indicated.

Stones in male children; very large stones in male adults, where the weight may be estimated at several ounces, and some smaller-sized recurrent stones complicated with sacculated, or bladders requiring drainage, but otherwise quite within the limits of lithotrity, may be generally stated as better adapted for lithotomy in some form. So far as male children are concerned, some surgeons will probably join issue with me. The large experience of Drs. Keegan and Freyer and other operators in India more particularly, as well as the smaller experience of some surgeons in this country and elsewhere, would seem to indicate that a skilled lithotritist may obtain most excellent results in even the youngest subjects from crushing. A short time ago my colleague, Mr. Heycock, crushed a hard stone weighing nearly an ounce and the boy was well and about within a week. But what about practitioners who are not skilled in lithotrity and yet have large experience generally in operative surgery? I feel under these circumstances that lithotomy as a rule will prove to be, as it always has been, the wiser selection.

In choosing the kind of lithotomy I must express my preference both in boys and adults for the lateral method, unless I want to remove a stone which from its size is not likely to come out very easily through the perineum, or if I wish to look into the bladder with the naked eye for the purpose of searching for a sacculus in which a stone may be lodged, and at the same time dealing with it. To the latter category, where the suprapubic operation is indicated, Mr. Mayo Robson ("British Medical Journal," March 9th, 1889) has added illustrations where not only has a stone been thus removed from the bladder, but a portion of the large prostate extirpated.

When prolonged drainage of the bladder is necessary in certain cases of chronic cystitis complicated with stone, or in some instances of recurring phosphatic stone, where the posterior wall of the bladder is much dependent, and a division of the floor of the prostate is required, I feel sure that the perineal route is to be preferred. I have seen successful instances

of this where drainage had previously been practised and maintained for some time by a suprapubic opening.

In comparing the suprapubic and lateral operations there can be no doubt that the former proceeding will recommend itself to many practitioners on the ground that it is the simpler of the two, and if for this reason it is the more efficiently executed, no better ground can be advanced for its selection, provided that the same end can be obtained. When I have chosen the suprapubic operation no attempt has been made to secure the primary healing of the wound, and so far as sutures are concerned, they have only been used for approximating a limited portion of the superficial wound. I then put in a large rubber drainage-tube, which is passed through a covering made by a wood-wool pad. The tube is retained for two or three days and then removed, the patient being kept absolutely dry by the constant use of the wood-wool pads, which have been found to be the simplest and most efficient mode of dressing. By using any dressing which does not absorb, infiltration of urine into the cellular tissue in front of the neck of the bladder may readily occur and retard the progress of the case.

Though lithotomy and lithotrity are as a rule employed to meet quite different conditions, I would like to remind you that they may be combined for some special reason with the happiest results. Here are the fragments of a large stone I removed two years ago by the operation known as perineal lithotrity. It practically consists in the making of an external urethrotomy sufficient to introduce the index finger, by means of which the parts constituting the neck of the bladder are dilated. Then a pair of crushing forceps, either straight or curved, as the case may be, are passed in, by means of which the stone or stones are rapidly crushed, so as to admit of their evacuation, partly by the forceps and partly by the aspirator. In this way I got rid of a large phosphatic stone, the fragments of which weighed nearly three ounces, in something under five minutes, a process which I do not think could have been as safely and as certainly accomplished under half an hour by the ordinary lithotrite and evacuator. The patient, a young man of eighteen years of age, was up and well with the wound soundly healed on the eleventh day. The crushing and extracting forceps which have been made for me

by Messrs. Krohne and Sesemann are shown in the figure (Fig. 4).

There are cases of stone, chiefly recurring ones, where not only is a digital examination of the bladder necessary, but where after the removal of the stone the bladder may with

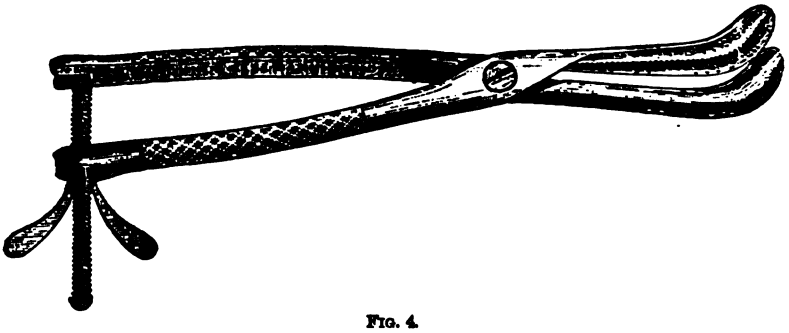

FIG. 4.

much advantage be submitted to a process of drainage with the view of preventing further relapse. In such instances I have availed myself of perineal lithotrity, the nearer approach to the bladder which the puncture permits of proving an important feature in promoting the success that has followed the adoption of this combination with practically no additional risk.

CHAPTER VI.

SOME MISCELLANEOUS POINTS.

In the first place I should like to say a few words in reference to the pathology of gleet, inasmuch as this extremely common affection is not only difficult to cure, but frequently proves the starting-point for much more serious conditions. Upon the pathology of gleet considerable light has been recently thrown by Oberlaender, by means of the electric endoscope, and various effects of persistent inflammation on the mucous tract have been pointed out. In the earlier stages of gleet, observation with the endoscope shows that the process practically consists in more or less acute epithelial desquamation, at points in the deep urethra where the affection is usually situated. In this way the slight amount of discharge which may be said to constitute the disease is supplied. Though there is generally some tumefaction about the affected spots, no stricture can then be said to exist, and treatment is still capable of bringing about a complete restoration of the parts without the subsequent introduction of any contractile tissue. And this brings me to consider the next stage in the process which eventually leads to the formation of an organized stricture. The function exercised by the epithelial coat of the urethra, and the consequences that may ensue when it becomes deranged by persistent inflammation, formed the subject for some observations in my Lettsomian Lectures before the Medical Society of London, in 1888. The view that I then advocated was, that by chronic inflammation, such as we see in gleet, the epithelial coat becomes so damaged at one or more spots as to lose its power of rendering the urethra urine-tight, and that a slow process of exudation through the mucous coat ensues. As a consequence of this, and to prevent urine soaking further into the tissues, inflammatory lymph-exudation in the submucous area is excited, and barriers of lymph which eventually become organized are thrown out opposite the

places where the leakages have taken place. The contraction of these submucous lymph barriers, I urged, completed the process of stricture formation. This view as to the pathology of stricture is supported by the following considerations: (1) That though the mucous membrane is the tissue chiefly concerned in the primary inflammation, it is as a rule only secondarily implicated in the stricture-forming process. In many instances it will be found after death that the dimensions of the mucous membrane are not permanently altered, and that it is possible to split a stricture without necessarily rupturing the lining membrane of the canal; and (2) the great variety in form and shape in which stricture tissue is deposited in relation with the urethra. I have known as many as a dozen irregular points of contraction in the urethra of a man, which were believed to be formed in the way I have described, consequent upon a very chronic gleet.

Though the views I have thus given expression to recognize the existence of varying degrees of tumefaction or swelling within the urethral walls at one or more spots in the initial stage of the stricture-forming process, I cannot admit the propriety of proceeding to the performance of internal urethrotomy for their removal, even though, as I have no doubt, they are capable of being demonstrated as obstacles to micturition by such instruments of precision as Otis' urethrameter. My experience, derived from the observation of cases of this kind which had been submitted by various surgeons, to internal section, is certainly not favorable to this method, however well adapted it may be to some advanced forms of cicatricial stricture. Some of the worst cases of stricture in the deep urethra that have come under my notice have been those where an internal urethrotomy had been performed during the early or gleety stage of the affection. In the pendulous urethra such ill effects following the operation have not been so frequently noticed.

In urging these opinions as explaining the mode in which stricture tissue is commonly deposited, I must not be regarded as failing to recognize that large class of strictures which are the result of wounds in the urethra. Here the healing process goes on with the wound exposed to the irritating influence of contact with pent-up urine, and the result is the formation of a cicatrix of the densest and most contractile description. That a dense contractile stricture is by no means a necessary

consequence of a torn or lacerated urethra, I have demonstrated by a series of cases where such injuries had been treated by perineal section and urine drainage, without leaving behind any trace of the original injury. Many of these cases have been watched for periods of time extending over two years.

In giving expression to these views as to the pathology of gleet and the healing of wounds of the urethra, it is for the purpose of emphasizing the importance of thorough irrigation in connection with the prevention and treatment of urethral stricture. I have long felt that the difficulty in this class of affections lies, not in the want of suitable medications, but in our imperfect means of using them. It is astonishing what perfect douching with cold water or some mild astringent will do in some cases where individuals are driven into the depths of despair by some small amount of urethral discharge, which frequently is no more hurtful than are the slight chronic excretions which proceed from other parts of the body that might be mentioned. The first apparatus I described for this purpose consisted of a Higginson's syringe, fitted with a smaller rubber catheter, by which a running stream of water could be maintained from any point in the deep urethra, outward ("On the Prevention of Stricture and Prostatic Obstructon." Churchill, 1881). More recently I have adopted for the same purpose as giving a more equable stream, a simple siphon apparatus, which was first made by Mr. Reynolds, of Liverpool, on the principle of Thudichum's nasal douche. It is principally in the treatment of gleet that I have found this instrument of most value. As a rule, the reservoir is filled with about six ounces of a solution of sulpho-carbolate of zinc, two grains to the ounce, with which the patient irrigates his urethra for some minutes once or twice a day. By compressing the meatus around the pipe of the irrigator the outflow is temporarily stopped, and the fluid is forced by hydrostatic pressure into the various lacunæ of the urethra, which, in chronic cases particularly, are more or less centres of infection. This thorough mode of irrigation is almost impossible to be obtained with an ordinary glass syringe, as the latter is often only worked at a great disadvantage, as I have had the means of demonstrating in a very simple manner. Alum, zinc, borax, acetate of lead, or Condy's fluid, may in some in-

stances be substituted for the sulpho-carbolate of zinc, but the latter has proved to be the most reliable. Now this simple, but not I believe sufficiently well-known means of douching the urethra, is capable of extension to other conditions than that mentioned, where it is necessary to bring the canal under direct medication. There are other discharges—prostatic, seminal, and mucous—which are often maintained by an unhealthy state of the urethra; for such of these as require local treatment, I have found it in the irrigator, rather than in the employment of those powerful and dangerous cauterizations, which at one time were advocated by Lallemand and others. In cases of orchitis, where the infection has proceeded from the urethra, as in gonorrhœa, I have found deep urethral irrigation with a solution of perchloride of mercury (1 in 10,000), most effective in shortening and moderating the attack.

Passing from this reference to the use of the douche in various urethral discharges, I would allude to it further as an important adjunct in the treatment of stricture by dilatation. After every dilatation, when the calibre of the stricture will permit the entrance of the fine point of the irrigator, I have the urethra well douched with warm water, commencing from the point immediately behind the obstruction. This is continued for a few minutes, and has a most beneficial effect, not only in thoroughly cleansing the canal, but in assisting, by hydrostatic pressure on the contracted parts, the process of dilatation. Strictures which have been treated in this way, have not only yielded to dilatation more rapidly, but what is of still more importance, they have, as might be expected, shown less tendency to contract, and have been more amenable to the subsequent use of the bougie. It is my habit to instruct patients to employ it themselves, as a necessary part of the treatment by dilatation.

A word may be said in reference to the use of the douche in connection with the treatment of the less complicated forms of urethral fistulæ. There is hardly anything which causes more annoyance to a patient otherwise sound, than the constant dribbling of small quantities of urine along a sinus opening in the perineum, or by the side of the scrotum, which has resulted either from a peri-urethral abscess, or from some simple surgical procedure connected with the urethra. The two great obstacles to sound healing from the bottom of the fistula

are (1) the persistence of some degree of stricture or contraction of the urethra in front of the communication with the false passage, and (2) an unclean, and therefore septic condition of the internal aperture caused by the lodgment of urine within the urethra after each act of micturition. When the stricture has been sufficiently dilated I have frequently succeeded in getting these sinuses to heal quickly and soundly, by making the patient irrigate his urethra with some suitable antiseptic three or four times in the course of the twenty-four hours.

And now I will draw attention to a few instruments I brought under notice some years ago (the "Lancet," February 3d, 1883), which I believe are by far the best and safest bougies we can employ in most cases of tight stricture. They are popularly known as "whips," being the name given to them by my friend Mr. Lund, in his Hunterian Lectures. They are made in different sizes, in lengths of about twenty inches, commencing by a filiform point, and gradually increasing toward the other extremity. In speaking of the value of these instruments, in the treatment of tight strictures especially, I am sure that a trial by those unacquainted with them will insure their adoption in that class of strictures where the difficulties of instrumentation are the greatest. In my own hands they have had an extended trial, and when I have demonstrated their employment to others, their adoption has generally followed. It is no small recommendation to say of an instrument of this kind, that it rarely fails to pass a stricture, so long as it is structurally pervious, however fine the passage may be; that dilatation necessarily follows upon this without risking the reintroduction of a bougie on a larger scale; and that these advantages can be secured without the liability to laceration and hemorrhage which often accompany the use of other instruments. This is important to remember, as every degree of laceration the urethra receives adds to that kind of tissue of which an organic tissue consists. Further, by reason of the tapering form of this bougie, every introduction of it not only stretches the stricture, and increases its calibre by several sizes of the French gauge, but it tends to make the entrance to the stricture from the front funnelled shape, and thus adds to the ease with which subsequent introductions are effected, either by the patient or the

practitioner. Patients find these instruments, after they have been taught their use by the surgeon, far more easy to introduce than any other, and as they cause little or no friction in making their way through the obstruction, the process of dilatation proceeds more rapidly than is the case when more abrupt bougies are used. It is better to soften new whips, by immersing them for a few seconds in warm water, so that they may curl up in the bladder without the patient being conscious of it, as is the case with the pilot bougies which are now so generally appended to many urethral instruments. By the use of this form of instrument, it is quite practicable, by the introduction of two or three larger ones, to bring up at once a very contracted stricture, until it will admit with ease a good-sized bougie or catheter. I believe that we cannot proceed too rapidly with this process. To relieve a patient with retention of urine by means of a fine catheter, perhaps tied in with the chance of it slipping out, is to leave him in a very sorry plight. A person who is going about dribbling, with a stricture of small calibre, is in constant danger of his life, as there is no knowing when sudden retention, perineal abscess, or extravasation of urine may supervene. Some melancholy illustrations of this must occur to every one who has seen much of urethral stricture. Mr. Robson ("Provincial Medical Journal," Vol. VIII., 1889) has recently illustrated the value of immediate dilatation with bougies, and in the commencement of this process I have found the whip invaluable.

In reference to the selection of instruments generally, I much prefer the flexible ones; they are readily introduced, and rarely cause hemorrhage. Those made of silk web have some advantage over the rubber catheter, as they can be used with a little more firmness. It is curious to observe the difference in the curves of the prostatic urethra; hence in one case a coudé slips in easiest, in another an olive-pointed instrument, while in a third an ordinary round-headed catheter glides in without trouble. It is important that the delivery power of a catheter should be relative to the normal size of the urethra, and not greatly in excess. What can be worse for a person who has been accustomed for some years to ooze or dribble his urine, than to have it suddenly drawn off *pleno rivo* in about half the usual time the normal act occupies? I have often found the too rapid emptying of the bladder in the

regular employment of catheterism an important factor in producing loss of natural expulsive power, and in retarding its return when it has been temporarily suspended. Nature will not provide muscle when it is not wanted. Here, then, we have at least two important reasons why the selection of catheters should not be handed over to the instrument maker alone, as a patient may very innocently do himself harm by means of a catheter unsuited to his case.

Whatever means or form of instrument, whether flexible or not, our individual experience prompts us to use in endeavoring to overcome the obstacles that some strictures present, should they prove ineffectual, I believe supra-pubic aspiration is the best and safest expedient of a temporary nature that can be employed. By means of this we can always depend on being able to empty a distended bladder with a very small amount of risk, and less, I believe, than what may in some instances attend difficult catheterism.

In reference to aspiration in connection with some urinary disorders, I believe that it occasionally offers the best and safest way of commencing what is now called the catheter life under certain circumstances. I will take a case to illustrate what I mean: A short time ago, a gentleman approaching seventy years of age, consulted me in reference to his prostate. Apparently he was in excellent health, but he was going about with a bladder full of urine which reached almost up to his umbilicus. He had never used a catheter, as he could evacuate three or four ounces of urine at a time, which he did at intervals of three or four hours. His prostate was enlarged, the urine was faintly acid, and frequently neutral, and had a specific gravity of 1004–6. Now it appeared to me that with a helpless bladder of this kind, and with kidneys working under so great disadvantage it would be extremely easy to induce that condition of septicæmia which Sir Andrew Clark has so graphically illustrated. On the other hand to leave him alone with this distention, though he was quite unconscious of it, was to him at that stage of affairs almost equally suicidal. Under these circumstances I determined to deal with the distended bladder by supra-pubic aspiration, and not to touch the urethra with the catheter. To commence with, I drew off four ounces of urine above the pubes with a fine aspirator needle. I aspirated nine times in a fortnight,

and by gradually increasing the quantity of urine removed, brought down the bladder to almost normal dimensions. Elastic pressure over the abdomen was at the same time exercised by a suitable bandage. The patient suffered in no respect whatever, and he continued to void naturally the amount of urine I have already mentioned. It was interesting to notice that as the pressure was removed from the urinary apparatus, the acid reaction became more pronounced, and the specific gravity rose to 1015 where it remained; under these altered conditions, I no longer hesitated to use the catheter daily, which the patient continued to do for himself with advantage and comfort. I thus avoided during the period of greatest risk in this case, when the urine was on the verge of alkalinity, and the kidneys hardly doing anything else than percolate water, any chance of introducing an important element of decomposition into the bladder or interfering with a urethra which had been distorted by prostatic hypertrophy. With acid urine and a fair specific gravity, with ordinary care there is comparatively little risk attendant the use of catheters, where these conditions are absent the danger with elderly males is by no means an imaginary one; in removing urine either by catheter or the aspirator from the atonic bladder, I feel sure that the employment of abdominal support in the shape of a binder or an elastic bandage is of much advantage. In connection with these remarks on the treatment of some forms of the atonic bladder by aspiration, instead of in the first instance by any attempt to introduce a catheter, I had noted the impunity with which the proceeding had been practised in those instances, where it had followed futile trials to pass a catheter by reason of a large prostate. It seemed rarer to find that fever followed this mode of removing urine from the paralyzed bladder, though many instances are recorded where it was resorted to for several consecutive days.

Cases of impassable urethral stricture are becoming rarer every day, and this means that a vast improvement has taken place within the last few years in the construction and design of instruments for this purpose. To suppose that one kind of catheter or bougie will answer every purpose, is to suppose that which if not at variance with common sense, is at all events opposed to any practical acquaintance with the pathological anatomy of urethral obstructions.

If after that degree of temporizing which supra-pubic aspiration gives in cases of impassable stricture, failure to enter *per viam naturalem* still continues, then I believe Wheelhouse's ingenious proceeding of entering the bladder from the perineum by the urethra is the one that commends itself to our attention. It is safe, and presents no difficulties which a surgeon need fear facing.

I should like to add a word as to the great value of cocaine as a local application in connection with a variety of small operations on the urethra, such as the passing of catheters and bougies, the stretching and dilating of strictures, and the management of various forms of prostatic obstruction where mechanical treatment is a necessity. With a very little trouble and delay, by the injection of a few drops of a 10-per-cent solution of cocaine by means of a suitable instrument, say, for instance, on the face of a contractile stricture, the operation of entering and passing through it with a bougie is in most persons rendered as nearly painless as it is possible. In this way persons will submit to treatment who would otherwise shrink by reason of the horror with which all pain or disagreeable sensation in this part is regarded. I have largely employed it under these circumstances, and am induced to refer to it here because I think its use not sufficiently appreciated in connection with what I would speak of as the minor operations on these parts. To attempt to crush large stones with it, or to use it where the operation occupies some time, is merely to bring a useful drug into discredit.

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